

1-1-1993

# Reinstatement of causal information in reading.

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FIVE COLLEGE  
DEPOSITORY

REINSTATEMENT OF CAUSAL INFORMATION IN READING

A Dissertation Presented

by

CELIA M. KLIN

Submitted to the Graduate School of the  
University of Massachusetts in partial fulfillment  
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

September 1993

Psychology Department



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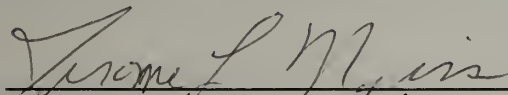
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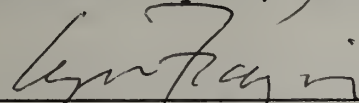
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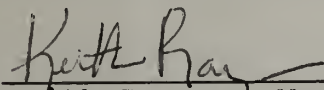
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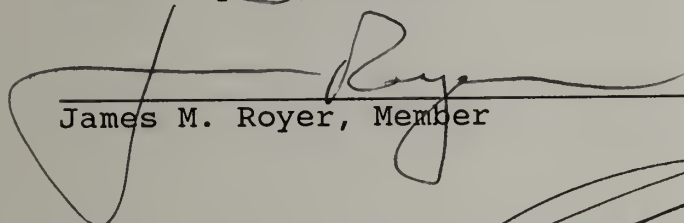
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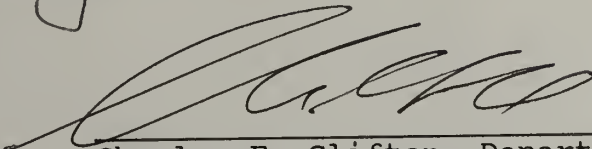
  
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## ACKNOWLEDGEMENTS

I would first like to thank the members of my committee: Lyn Frazier, Sandy Pollatsek, Keith Rayner, and Mike Royer, for their time and their assistance with this dissertation.

Thanks also go to the rest of the Cognitive faculty for nuggets of wisdom from time to time. A special thank you to Arnie Well, first for being an advisor, and then for being a good neighbor on the hall.

Without the other graduate students, past and present, it wouldn't have been nearly as much fun: Thanks to Robin Morris, Susan Boyce, and Kevin Stone, for showing me the way; to Ruth Litovsky for being so nice that first day of statistics so many years ago; to Rene Schmauder and John Huitema, for being there from the start (get your third of a dollar ready); to John Murray for introducing me to Wanda Merrill, to Jill Lohmeier for providing moments of sanity, to Alix Sholl for chats in the car, to Rob Mason for carrying on the tradition and to Helene O'Connor for making the office a nice place to be.

Thank you also to all those outside of Tobin Hall for reminding me that there WAS life outside of Tobin Hall (sometimes). That's family and friends, too many to mention. And a special thank you to Sue, for that 93.2 percent interrater reliability in Experiment 5, and for being really

good company along the way.

And a final, and most important thank you goes to Jerry Myers for being a wonderful mentor in every way.

ABSTRACT

REINSTATEMENT OF CAUSAL INFORMATION IN READING

SEPTEMBER 1993

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Four different tasks were used to investigate if readers reinstate information which is no longer in focus when it is needed to resolve a break in causal coherence. In five experiments an inference condition was included in which passages contained a causal coherence break which could be resolved by reinstating a backgrounded concept. In Experiment 1, the results of a recognition task provided evidence that readers were able to integrate the targeted cause more easily with the inference version than the control version of the passage, either because of processes occurring while reading or at the time of test. In Experiments 2 and 3, the results of a word naming task provided evidence that the backgrounded cause was reactivated during reading in the inference condition after encountering the coherence break. In Experiment 4, the results of a reading time measure suggested that readers did not only reactivate a single concept, but used this concept to form a new proposition which acted as a cause for the

action in the focal sentence. The causal link was maintained in working memory. According to the results of the recall test in the final experiment, the causal link was also included in the long-term memory text representation. The results were interpreted as support for a fast, direct access, "resonance" process rather than a slow, deliberate search.

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# C H A P T E R I

## INTRODUCTION

The ultimate goal in the study of discourse processing is to have a theory which includes both a description of the representation of a discourse in a reader's memory and a model specifying the process of constructing that representation. The representation of a text in memory includes both information which has been explicitly stated and much that has been left implicit by the author. Readers must draw inferences based on the propositions in the text and on their world knowledge. In order to develop a theory of how readers construct a coherent memory representation of a text, an understanding is needed of the inferential process.

Although no complete model of discourse processing exists, several investigators of text comprehension have taken positions as to the conditions under which different types of inferences are drawn. Before turning to a review and evaluation of these various positions, a brief overview of the questions and some definitions will be given.

There are many inferences which could be drawn for even very simple passages. Readers may find antecedents to anaphors, infer the instrument or tool for accomplishing an action, or the consequences or the causes of a character's

actions. Readers clearly cannot draw all of the possible inferences nor can their representation of the text consist solely of the explicitly stated information. In a recent paper, McKoon and Ratcliff (1992) suggest that a reasonable place to begin the study of inferences is with inferences which are considered necessary for maintaining the coherence of the text. This is a reasonable approach given that readers are more likely to draw inferences to establish coherence in a text than to draw inferences which simply serve as elaborations for an already coherent text. In addition, non-necessary, or elaborative inferences, are more difficult to study because they tend to be influenced by subtle characteristics of the text and by the motivation of the reader.

The distinction between necessary and elaborative inferences is somewhat vague, due in part to the difficulties of defining coherence. Nonetheless, it is a useful distinction. Elaborative inferences do not contribute to the coherence of the text but serve to embellish it. One example of an elaborative inference is the forward, or predictive, inference. A forward inference involves inferring what is going to happen next in a discourse. Drawing this type of inference can actually be detrimental to comprehension because readers run the risk of drawing the wrong inference.

On the other end of the continuum are anaphoric inferences. Finding the antecedent for a pronoun is probably the clearest example of a necessary inference. If a currently processed portion of text provides information about the actions or properties of a character, in order to attach this information to the appropriate entity in the text representation, the reader must know if that character is being newly introduced or is already represented. For example, when a pronoun is encountered the new arguments introduced in that input cannot be assigned to a person or other entity in the discourse representation until the antecedent is found.

Causal inferences involve inferring causes for events or actions described in a discourse. They have been categorized as necessary inferences by investigators who assume that discourse comprehension involves building a representation of the causal structure underlying a discourse (Black & Bower, 1980; Graesser, 1981; Trabasso & Sperry, 1985; Trabasso & van den Broek, 1985; Fletcher & Bloom, 1988). While strong claims have been made about the causal structure of text and the conditions under which causal inferences are drawn, the data testing these claims have been inconclusive. The study of causal inferences is important, both for an understanding of the inferential process, and as a test of several prominent theories of



discourse processing which view causal structure as fundamental to building a coherent text representation.

In the following section, I will review several of the models which take positions with respect to which inferences are drawn and under what conditions. Evidence will be presented which is relevant to each of these models. Emphasis will be placed on causal inferences. Based on the models discussed, several hypotheses will be presented. Each of these describes one possible response of readers to a lack of causal coherence in a discourse. Finally, a series of experiments is presented which were designed to distinguish among the hypotheses.

## CHAPTER II

### REVIEW OF THE LITERATURE

#### A. Kintsch and van Dijk's Model

Kintsch and van Dijk (1978) developed an influential model of discourse processing which emphasized short-term memory (STM) as the bottleneck in the processing of text. According to their leading-edge strategy, readers process texts in cycles, maintaining a subset of the propositions in STM on each cycle. Propositions are selected for retention in the STM buffer based on both recency and importance. Readers attempt to connect each new input to the propositions which are in the STM buffer. The mechanism by which propositions are connected is referential, or argument, overlap. Two propositions are connected if they are referentially coherent; in other words, if they refer to the same event, object, or person. A resource consuming search of the text representation takes place if there is no overlap in arguments with propositions in the STM buffer. If this search fails, readers then draw inferences based on their world knowledge. The assumption that a coherence break initiates a resource consuming search has been incorporated into most of the models which will be considered here. However, it is now well accepted that argument overlap is not the sole basis for forming a coher-

ent text representation (e.g. Fletcher, 1986; Keenan, Baillet & Brown, 1984; McKoon & Ratcliff, 1980; O'Brien, 1987; van Dijk & Kintsch, 1983). Keenan et al. argued that referential overlap is neither sufficient for maintaining coherence ("Tom Jones plans to go to the dentist. A plane flew over Tom Jones.") nor is it necessary ("Things were getting very tense. Suddenly John punched George and knocked him out. Mary started screaming."). Several investigators (Haberlandt & Bingham, 1978; Keenan et al., 1984; Myers, Shinjo, & Duffy, 1987) have found empirical support for this claim. With sentence pairs which were equally referentially coherent, reading time on the second sentence differed as a function of factors such as the causal coherence of the pair.

#### B. Trabasso's Model

Trabasso and his colleagues (Trabasso & van den Broek, 1985; Trabasso & Sperry, 1985), have presented an analysis of the causal structure of the text. They have never explicitly stated that the text structure and the memory representation are the same, nor have they specified the process by which this structure is created. Nevertheless, they have correlated performance measures, such as recall, with aspects of the text structure. The text structure which they present is a highly interconnected network. In order to form a memory representation which is consistent

with this text structure, readers would have to be very active, continually reinstating backgrounded information to form connections between propositions.

Results from several studies provide support for Trabasso's model. The number of causal links an event has to the rest of the text and whether or not an event lies along the causal chain have been shown to correlate with the probability of recall (Trabasso & van den Broek, 1985), the rated importance of an event (Trabasso & Sperry, 1985), and the frequency of inclusion in summaries (van den Broek and Trabasso, 1986). Despite this support, it is unlikely that readers form all of the causal connections predicted by Trabasso's model. Given the limitations of working memory, readers would have to continually search the discourse representation to form all of the connections. The processor would have to be extremely active and slow if each input initiated a search of the entire discourse representation. A second problem is that most of the data in support of Trabasso's model come from off-line measures and may therefore be the result of processes occurring at the time of the test rather than during reading. In addition, regression analyses, such as the ones used in the studies cited, are sensitive to such factors as correlations among predictors and the selection of predictors for inclusion in the analysis (Myers, 1990).



### C. Fletcher and Bloom's Current-State Model

Fletcher and Bloom (1988) attempted to reconcile Kintsch and van Dijk's emphasis on processing cycles with studies demonstrating the importance of causal structure. In their "current-state selection strategy," causal connections replaced argument overlap as the basis for integrating inputs with propositions in the STM buffer.

Fletcher and Bloom view reading as an active, problem solving process in which readers attempt to build a causal chain linking together the events in the narrative. Readers identify the most recent clause without a causal consequence. This clause is held over in STM because it is the most likely causal antecedent of the next sentence that is read. This allows the reader to form a causal path linking the text's opening to its final outcome. As well, maintaining these potential causal antecedents enables readers to minimize the number of times they need to search memory for a missing causal antecedent. In contrast to Trabasso's model which predicts that readers will form all possible causal links, this model predicts that readers will only search the text representation to form connections when this is needed to maintain coherence.

Fletcher and Bloom tested the current-state model by using a free recall procedure and found that it accounted for significantly more variance in recall data (31%) than did Kintsch and van Dijk's leading-edge strategy. A second

source of support for this model is based on the prediction that readers should search LTM when they encounter a clause for which no cause is available in STM. If readers are connecting each input action with a prior cause, the lack of a cause should lead to a search. Bloom, Fletcher, Reitz, & Shapiro (1990) found that reading time increased when readers encountered a clause which had no adequate cause in STM. They concluded that the increase in reading time reflected the time needed to search LTM.

Although both these studies provided evidence consistent with the model, there are alternative interpretations. Like Trabasso and his colleagues, Fletcher and Bloom used recall measures to test their model. Because this is an off-line measure, it is possible that the data reflect reconstructive processes taking place at the time of test. Bloom et al. used reading time, which is an on-line measure, but prolonged reading times may have been the result of readers' confusion rather than the result of a memory search. Finding no immediate cause for the action or event may have slowed readers down because the clause could not be easily integrated with the rest of the passage. Contrary to the conclusions reached by Bloom et al., readers may have then just read on rather than searching their memory, assuming that a cause would be provided.

An additional problem with the current-state model is that it must assume that causes are entities in and of them-



selves which can be identified as such and selected for retention in STM. The sentence "It was a cloudy day" can be setting information which is never referred to again in the text or it may act as a cause for rain. According to this model, causes are somehow identifiable even before the consequence is known. Furthermore, the passages used in their experiments bear little resemblance to real narratives. They proceed linearly with few digressions and little descriptive information. It is not clear if the model would account for the processing of more natural texts. The following is an example of one of Fletcher and Bloom's passages:

Once there was a farmer who wanted to get a very stubborn donkey into his barn. He thought that if he could get his dog to bark, that would frighten the donkey into the barn. But the dog was lazy and refused to bark. The farmer asked his cat to scratch the dog, thinking that this would cause him to bark....

#### D. Van den Broek's Causal Inference Maker (CIM)

According to van den Broek (1990), a lack of a clear understanding of what constitutes a causal relation is at least partially responsible for the fact that a consistent picture has not emerged from the studies of causal inferences. He proposed guidelines for evaluating causal relations based on four formal criteria borrowed from philosophical and legal theories of causality: According to the criterion of temporal priority the cause never occurs after the consequence. The criterion of operativity states that

the cause must still be active when the consequence occurs. Whereas temporal priority and operativity are either present or absent and are requirements for causality, the next two criteria affect the strength of a causal relation. Necessity in the circumstances is based on the counterfactual: if not A, then not B. If the cause does not occur then the consequence may not occur. According to the criterion of sufficiency in the circumstances, if the cause is present, the consequence is likely.

Each new input requires the presence of information in STM which fills the criteria of temporal priority, operativity, necessity and sufficiency. When this requirement is not met, this constitutes a causal coherence break. The CIM predicts that readers will attempt to locate and reinstate a cause from elsewhere in the discourse representation when they encounter a causal coherence break. If no cause is available and the reinstatement search is unsuccessful, readers may then elaborate on the text or infer a cause from their general knowledge.

Trabasso, van den Broek, and Suh (1989) tested the psychological validity of the CIM. They found that subjects judged two statements to be more strongly related the more strongly they were related according to the four criteria of temporal priority, operativity, necessity and sufficiency. Subjects also judged two causally related statements to be more strongly related than two statements which were not

causally related but were closer together in the surface structure.

Van den Broek's CIM, Fletcher and Bloom's current-state model, and Kintsch and van Dijk's model share the assumption that readers process texts in cycles. Some portion of the text is held over on each cycle and incoming text is then tied to this. A second important assumption which the models share is that when an input cannot be integrated with the information in the buffer, readers engage in time consuming searches of the text representation and of their world knowledge. Where the models differ is in their definitions of coherence. Kintsch and van Dijk's model requires argument overlap for coherence. More recent models emphasize causal relations. Before considering the evidence for the central role of causality, the concept of causal coherence will be examined.

### CHAPTER III

#### WHAT IS CAUSAL COHERENCE?

Both van den Broek's CIM and Fletcher and Bloom's current-state model (see also Graesser, 1981; Omanson, 1982) depend strongly on the assumption that texts are organized causally and that causal coherence breaks trigger reinstatement searches. In order to test these assumptions, an understanding is needed of a causal coherence break. Van den Broek's definition of a causal coherence break relies on the concepts of necessity and sufficiency. If information in STM provides neither a necessary nor sufficient cause for the current input, this constitutes a coherence break. A shortcoming of this definition is that it does not distinguish between different types of inputs nor does it acknowledge that there are inputs which do not require a cause. These include states, rather than events, such as setting information: "It was a warm summer day"; or descriptions of characters: "Wanda was 65 years old." There are also events for which no cause is required. These are actions which are scriptal or fit easily with readers' world knowledge. These actions do not require a cause to be explicitly stated in the discourse or to be available from world knowledge. For example:



"...Maggie didn't manage to leave the office until 7:00. When she got home from work she changed her clothes".

No explicit cause is given for Maggie changing her clothes, but it is unlikely that readers will find this two sentence sequence incoherent, nor will they search the text representation for a cause. Based on van den Broek's definition, this constitutes a coherence break because neither staying in the office until 7:00 nor coming home from work are necessary or sufficient causes for Maggie to change her clothes. But changing one's clothes is a common activity which fits with our expectation, or with our script of coming home from work. Because of this, it is unlikely that readers will treat this as a causal coherence break and search the text representation or LTM for a cause.

In comparison, consider the following sentence pair from Myers et al. (1987):

"...Joey went to play baseball with his brother. The next day his body was covered with bruises."

In this example, readers are likely to reinstate a cause from earlier in the passage if one exists (for example, "Joey and his brother were always getting into fights") or to use their world knowledge to elaborate (His brother or somebody else must have hit him, he got hit with a bat, etc.) Being covered with bruises after playing a game of baseball does not fit with our expectations. This seems to be closer to what van den Broek refers to as a causal coherence break.

As is illustrated by these examples, van den Broek's CIM and Fletcher and Bloom's current-state model do not adequately capture the complexity of integrating current inputs with the prior text. It is unlikely that a cause is required for each input, regardless of the type of input. The need for a cause seems to lie on a continuum with some inputs strongly requiring an explicit cause and others fitting with world knowledge, or the situation set up by the text. There are recall and reading time data which support this view that causal relatedness lies on a continuum (Duffy, Shinjo, & Myers, 1990; Keenan et al., 1984; Myers et al., 1987). In a rating task with sentence pairs, subjects reliably detected the varying level of causal relatedness between a second sentence and four versions of the first sentence. Both recall and the probability of inferring a cause varied as a function of the rated causal distance between the sentences. These results provide evidence that a continuum of causal relatedness has psychological validity and that the probability of drawing a causal inference is affected by the level of relatedness.

Given that it is unlikely that readers require a cause for each input, as Trabasso and others have suggested, there is no one answer to the question: Do readers draw causal inferences when they encounter actions for which no cause is available in STM? The answer must depend on a number of variables. One important variable in studies designed to



investigate causal inferences is the nature of the coherence break itself. In the experiments to be discussed in this dissertation, the passages used were written to contain breaks in causal coherence in which the prior few sentences did not contain a necessary or sufficient cause. A cause also could not be easily found by using world knowledge. In no way were they scriptal or were they commonly encountered actions. For example, after describing two boys setting up camp, one of the boys was described as running fearfully back to the campsite. Without reinstating backgrounded information about dangerous bears in the park, there was no easily available cause for the boy to be scared. Children are scared of a large number of things in the woods, and no one of these possible causes is particularly prominent.

A second set of questions involves the process of reinstating backgrounded information: If a cause is not required for each new input, how do readers determine which inputs do require causes? Is it the causal coherence break alone which determines if backgrounded information is reinstated, or does the existence of, and the nature of, that backgrounded information itself play a role in determining if an inference will be drawn? These questions will be addressed in more detail in the experiments which follow.

## C H A P T E R   I V

### EVIDENCE FOR CAUSAL REINSTATEMENT

Despite the predictions made by some of the models, readers may not reinstate backgrounded causes at all. This is predicted by van Dijk and Kintsch's (1983) "wait-and-see" strategy. According to this strategy, when adjacent clauses or propositions are not coherent, readers wait for necessary information to be given rather than reinstating information from the text representation or from world knowledge. In a paper examining predictive inferences, Duffy (1986) tested a similar hypothesis. Her focus model assumes that readers do not develop specific expectations but rather simply focus their attention on actions and events which have no obvious cause. They then attempt to connect incoming inputs to these actions. In other words, the absence of a cause leads to additional attention, or focus, but not to an active search of the text representation or of long term memory. Duffy found empirical support for the focus model in her investigation of predictive inferences. In view of these results, it is possible that when subjects encounter a causal coherence break they may not search the text representation but instead they may wait for additional information to be provided.

The wait-and-see strategy is plausible given the way texts are often written. It is common for actions to be followed by causes rather than preceded by them. Consider the following examples:

Greg decided to go back to school. He knew he was in a dead-end job.

Stacy called the doctor. Her throat has been sore all week.

In both of these examples, the second sentence provides a cause for the action in the first: Greg decided to go back to school because he was in a dead-end job. Stacy decided to call the doctor because her throat was sore. It can be argued that it is a waste of resources for readers to infer causes for all actions and events since the cause is often provided in subsequent sections of the text. Readers also run the risk of drawing the wrong conclusion by inferring the wrong cause.

The experimental evidence has tended to support the claim that readers do reinstate information in response to a causal coherence break; this position will be referred to as the reinstatement hypothesis. Despite this evidence, the question remains open because most of the evidence has been open to alternative interpretations. For example, one set of studies found increased reading times in response to a decrease in causal coherence (Bloom et al., 1990; Haberlandt & Bingham, 1978; Keenan et al., 1984; Myers et al., 1987; O'Brien and Myers, 1987; van den Broek, 1990). This finding

has been interpreted as evidence that readers attempt to reinstate a cause when there is a lack of causal coherence. But as noted, prolonged reading times may be the result of readers' confusion at finding no cause for an event or action. They do not provide evidence that a reinstatement has been attempted or has been successful.

Dopkins, Klin, and Myers (1993) avoided the problems associated with reading time by testing for activation of a reinstated cause. Subjects read passages in which a protagonist had a specific goal ("...the captain began an investigation in order to nab the thief"). The critical line constituted a coherence break ("The captain had the purser brought to his office"); there was no sufficient cause for the action in the preceding sentence nor was one easily available from world knowledge. After reading the critical line, the time to recognize a word from earlier in the text which represented the cause of the action (THIEF) was facilitated relative to a control condition in which the critical line did not constitute a coherence break. Readers reinstated the goal information after encountering a causal coherence break when the goal was not yet satisfied and the focal action could not be linked to a more recent proposition.

Although these results support the claim that backgrounded causes are reinstated in response to a causal coherence break, this result may not be very general. Goals



may have a special status in text. The reinstatement of the backgrounded information may have been due to the presence of a goal statement. Another reason why these inferences may have been drawn is that these were relatively simple inferences. Dopkins et al. concluded that the inference was the result of a "low-level reinstatement hypothesis." This hypothesis is similar to Garrod and Sanford's (1977) view of anaphor comprehension. In each passage the inference involved forming a connection between the goal category (THIEF in this example) and the outcome category (PURSER). These inferences resembled anaphoric inferences because they involved the mapping of a discourse entity, the outcome category, against nodes in memory representing entities described by the previous text.

Klin and Myers (1993) tested for activation of a backgrounded cause which did not constitute a goal and involved something more complex than mapping a current discourse entity onto an entity which had already been set up. Subjects read passages in which the cause for an action occurring in the last line was introduced early in the passage. ("The forest ranger told Bobby and Tim to be careful of the bears in the woods. One had recently attacked some campers and they had been badly hurt.") After extensive backgrounding, a critical line appeared which consisted of a coherence break in the inference version ("Bobby came running back from the woods, obviously very



frightened"). A sufficient cause could not be found in the immediately preceding context nor could readers' world knowledge easily provide a cause. Subjects were probed with a key word from the proposition to be reinstated, BEAR in this example. A word naming probe was used as the dependent variable because there is evidence that word naming is not susceptible to context checking (Schustack, Ehrlich, & Rayner, 1987; Seidenberg, Waters, Sanders, & Langer, 1984; West & Stanovich, 1982). In addition, there is now substantial evidence that naming times are sensitive to activated inferences (O'Brien, Duffy, & Myers, 1986; O'Brien, Plewes, & Albrecht, 1990; Potts, Keenan, & Golding, 1988). Subjects named the probe significantly faster after the inference condition than after a control version in which the last line did not constitute a coherence break.

These results can be taken as support for the reinstatement hypothesis. Backgrounded information was reactivated in response to a coherence break even though readers did not know that they were at the end of the passage when the probe word appeared. It would have been reasonable for them to read on, expecting that a cause for the current action would be provided. Based on the findings of Bloom et al. (1990) and van den Broek (1990) there was reason to expect longer reading times when the backgrounded causal information was reinstated in the inference condition. This is because the reinstatement process is

assumed to be accomplished through a deliberate search through the discourse representation. Contrary to this expectation, there was no slow-down in reading time in the inference condition in Klin & Myers (1993). This may have been due to differences in the last line in the two versions of the passage, or, as Klin & Myers (1993) suggest (see also Albrecht & O'Brien, in press; Huitema, Dopkins, Klin & Myers, in press; Myers, O'Brien, Albrecht, & Mason, accepted pending revision), it might be evidence for an mechanism that is very different than that in van den Broek's search model.

Instead of characterizing the reinstatement process as a deliberate search, it may be more accurately described as a fast, direct access process. In this view, the reinstatement process is not initiated by the coherence break but by the overlap of traces in the focal sentence and those in the discourse representation. These traces, or features, are semantic in nature rather than lexical; the exact repetition of words is not necessary. Consider the example about the boys and the bears. The initial description of the bears includes, both explicitly and through readers' elaborations, the traces fear and danger. These traces are also present in the causal coherence break. This overlap of traces causes the inactive elements to become reactivated, or to "resonate." In a subsequent stage the concepts and propositions which were reactivated may

then be integrated into the text. It is in this stage that a lack of causal coherence may have an effect. Without the coherence break, backgrounded concepts might only become temporarily reactivated because there would be no basis for integrating them with the focal proposition. In this view, causal inferences will only occur when there is sufficient overlap between traces in the coherence break and traces in the discourse representation and when these reactivated traces can be integrated with the focal sentence.

This view has much in common with Kintsch's Construction-Integration model (1988; Kintsch & Welsh, 1991). In the construction phase the parsed linguistic input is used to form a propositional representation. Each concept or proposition serves as a cue for the retrieval of associated nodes. This occurs in a process which is similar to the sampling process in Raaijmaker and Shiffrin's (1981) SAM model. Associated concepts and propositions from the readers' general knowledge base become available. Kintsch describes this stage as using "sloppy" rules, giving the system flexibility and speed. This construction phase is followed by an integration phase during which a spreading activation process selects certain concepts and propositions and leaves the readers with a coherent representation. Whereas none of the following experiments were designed to definitively distinguish between the search hypothesis and

the resonance hypothesis, the results of the experiments will be discussed in terms of these opposing hypotheses.

The following experiments investigate the "resonance" hypothesis just described and also investigate the generalizability of the results of Klin & Myers (1993). The most serious concern is the 500 ms delay which was present between the end of the passage and the presentation of the probe word. Swinney and Osterhout (1990) claim that "a 500-msec delay in processing is an enormous amount of time" (p. 29).

The design of the experiment in Klin & Myers (1993), the use of word naming as the dependent measure, and the number of filler passages make it unlikely that the reinstatement effect was due to strategic processes. For example, in the third experiment, subjects read a total of 40 passages. Of these, 20 were experimental and the other 20 were filler passages. Of the 20 experimental passages, 10 were in a control condition in which there was no causal coherence break. Of the 10 experimental passages which contained a causal coherence break, five were in a disconfirmed condition, in which the passage was written so that there was no appropriate cause to reinstate (The bears had died off). Therefore, in only five out of 40 passages was there a causal inference to be drawn. It is unlikely that readers caught on to the nature of the passages and



developed a strategy which accounted for the effects found in the experiment.

What is possible, however, is that the 500 ms delay between the end of the final sentence and the appearance of the probe was necessary for the causal inference to be drawn. Under normal reading conditions, readers may not have drawn a specific inference. This could be true for two different reasons: The first is that attentional and processing resources are needed to reinstate information from earlier in the text and to integrate it with the current input. The 500 ms delay may have freed readers' resources. During normal reading, this time would have been filled with additional incoming text.

A second possible reason for the necessity of the 500 ms delay is that causal inferences take time to develop. This hypothesis is consistent with findings on the time course of the resolution of anaphors. Only when gender cues are available and a pronoun is unambiguous has there been evidence that the antecedent is assigned as soon as the pronoun is fixated. In all other cases, eye movement data has shown that processing continues to be slow on the one or two words after the pronoun (Ehrlich & Rayner, 1983; Vonk, 1984). Additional support for this idea comes from Till, Mross, and Kintsch (1988) who only found facilitation in a lexical decision task on inference words at 1000 and 1500 ms SOAs. If readers take time to draw causal inferences, there



may not be any evidence of activation on the reinstated concept without the 500 ms delay. It may not have been the inclusion of "blank" time that was important but the 500 ms itself. In normal reading, readers may not complete causal inferences until one or two words after they complete the clause which contains the causal coherence break. While the first explanation implies that the findings of Klin and Myers do not generalize to normal reading, this is not true of this explanation. It only claims that the 500 delay was needed in order to tap into a process that occurs in normal reading.

In summary, many of the models reviewed in the preceding section share the premise that comprehension involves building a causal structure. It has been proposed by many researchers that readers reinstate information from the text representation or from their world knowledge when no adequate cause can be found for the current input. Most of the support for this claim has been open to alternative interpretations, either because reading time or off-line measures were used, or, in the case of Klin & Myers (1993), because the probe occurred after a delay.

The primary goal of the following set of experiments was to distinguish between the reinstatement and the wait-and-see hypotheses. After establishing that the causal link could be formed with these materials (Experiment 1), Experiments 2 and 3 used a delay that was shorter than the

500 ms delay used in the Klin & Myers (1993) experiments. This was done in order to determine if the 500 ms of blank time was necessary for the causal information to be reactivated or if support could be found for the reinstatement hypothesis in conditions closer to normal reading. A secondary goal of these experiments was to determine the status of the reactivated information at various points in time. Experiment 4 investigated if the backgrounded cause was only momentarily reactivated or if the reactivated information was available during the processing of the subsequent sentence. In Experiment 5 the effects of reinstating backgrounded causal information on readers' long-term memory representation was explored.

## C H A P T E R V

### EXPERIMENT 1

#### A. Introduction

Before running Experiment 2, the passages were pre-tested in Experiment 1. The materials were adapted from Klin & Myers (1993). Many of the passages were rewritten slightly, a few passages were dropped, and several new passages were created. There was a number of reasons for these modifications including a new control condition which was used. Several of the existing passages could not be adequately modified to conform to the parameters of this control condition. Some passages were also rewritten so that there were not any words in the causal coherence break which in any way related back to the elaboration section of the passage. For example, in one passage in Klin & Myers (1993) the probe word was wife and home was referred to in the final sentence of the passage.

There were three versions of each passage. In the inference condition the last line described an action or event which was caused by an entity described earlier in the passage which was no longer in focus; in the control condition the last line described the same action or event, but a cause was provided for that action or event in the penultimate line; and in the disconfirmed condition the

causal information was changed so that it was no longer an appropriate cause of the action or event in the last line. Although recognition time on the probe word was the primary dependent measure, reading time on the last line was also of interest. In contrast to the passages used in Klin & Myers (1993), the last line remained constant for all versions of each passage. This allowed for a comparison of reading times on identical last lines.

In order to determine if readers found the backgrounded causal information adequate to resolve the coherence break, a recognition task was used. Subjects had to decide if a word representing the targeted cause had been included in the prior text. Because a recognition task was used, there are two possible explanations for a faster response to the probe word in the inference condition than in the control condition. The first explanation for facilitation in the inference condition is that the targeted cause was reactivated during reading. The second possibility is that subjects evaluated how compatible the probe was with the passage after it was presented. The probe word (BEAR), for example, may have reactivated related concepts and propositions in the discourse representation (there are dangerous bears in the woods) which readers attempted to integrate with the focal sentence. As Keenan, Potts, Golding, and Jennings (1990) point out, context checking is potentially problematic when recognition tasks are used in



this type of experiment because, by definition, the probe is more compatible with the inference version than the control version. This is irrelevant in the current experiment, however, because the goal was merely to establish if the causal link could be formed, either while reading or at the time of test. Subsequent experiments will address the issue of on-line activation.

## B. Method

### 1. Subjects

Thirty-eight undergraduates at the University of Massachusetts at Amherst participated in exchange for extra credit in a psychology class. Subjects making more than 10% errors on comprehension questions were excluded. This led to the elimination of four subjects.

### 2. Materials

There were 18 experimental passages and 26 filler passages. An example of the inference, control, and disconfirmed versions of the experimental passages is presented in Table 1. (Refer to Appendix A for the complete set of materials.) The passages ranged in length from 15 to 25 lines, averaging about fifty characters per line.



## Table 1

Experiments 1 and 2 - Sample passage.

### INTRODUCTION

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He talked about the plants and animals they might

### ELABORATION

Inference and Control conditions  
see. He warned them to be careful of bears. One had recently attacked some campers in the woods and they had been badly hurt. Then the

Disconfirmed condition  
see. He told them that there had been dangerous bears in the woods. But as the climate changed, they had all died off. Then the

### BACKGROUNDING

ranger gave each boy a map and showed them the location of their campsites. Bobby and his friend Tim found theirs with no trouble. They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire. Minutes

### PENULTIMATE LINE

Inference and Disconfirmed conditions  
later, Tim saw Bobby coming back to the campsite.

Control condition  
later, Tim saw Bobby being chased by a big bee.

### LAST LINE

He was running hard, obviously very frightened.

### PROBE

BEAR

The inference version ended with a causal coherence break. The only sufficient cause for the action in the critical line was backgrounded by five to six lines of text. Not only did this backgrounding material contain no mention of the targeted cause, but it completely changed the focus, often including a change of scene and the introduction of new characters. Assuming either the leading-edge (Kintsch & van Dijk, 1978) or Fletcher & Bloom's (1978) current-state selection strategy, the causal information was not in working memory when the final line of the passage was read. The elaboration averaged 32 words in length, ranging from 21 to 55 words. This spanned from two to four sentences, and three to seven lines of text. The probe word (for example, BEAR) was explicitly mentioned an average of two times in this section.

The control version did not have a causal coherence break. In order to maintain the same last line, the coherence break was eliminated in the control condition by including a cause for the final action in the penultimate line. In the example given, Bobby is running in fear because he is being chased by a big bee. According to van den Broek's CIM there was no reason for readers to reinstate information about the bears after reading the critical line because a sufficient cause is provided in the prior sentence.

The disconfirmed version was identical to the inference version except for the elaboration section. In contrast to the inference version, the backgrounded causal information was an unlikely cause of the action in the critical line. In the example given, the bears are described as having died off as the climate changed. There is approximately the same amount of elaboration about the bears, and the word *toppled* (BEAR) was mentioned an equal number of times.

The filler trials were used to create negative trials. The probe word following the filler trials was always a word which had not appeared in the passage.

### 3. Design

For each subject the 18 experimental passages were randomly assigned to the three conditions with two constraints: (a) Each subject read 6 passages in the inference version, 6 passages in the control version, and 6 passages in the disconfirmed version, and (b) each version of each passage was presented to one-third of the subjects. Filler trials were interspersed among the experimental trials.

### 4. Procedure

Subjects were tested individually in sessions that lasted approximately 40 minutes. The passages were presented on a video monitor. Subjects were instructed to read for comprehension at their own pace. Each trial

began with the presentation of the word READY at the center of the screen. The subject controlled the presentation of the text with a line advance key. Each key press caused the current line to be erased and the next line to be presented. The lines were presented exactly as they are shown in Table 1. Immediately after the last line of the text had been presented, the string XXX was presented in the center of the screen. After 500 ms, the string was replaced by the probe word in capital letters. Subjects were instructed to decide, as quickly and accurately as possible, whether the probe word had been present in the preceding text. They responded by pressing one of a pair of response keys. On those trials on which the subject responded incorrectly, or did not respond within 8 seconds, the word ERROR was presented in the center of the screen for 500 ms. To ensure that subjects read the texts carefully, each trial ended with a yes/no comprehension question. Subjects were given three practice trials before beginning the experiment. They were provided with two breaks during the session.

### C. Results

The mean latencies (in milliseconds) for correct responses, reading time on the last line, and error rates for the experimental passages are presented in Table 2.



Outliers, as defined by Tukey's (1977) criterion<sup>1</sup>, were discarded; 1.5% of the response times were dropped from the analysis. In all analyses to be reported, an alpha level of .05 was used;  $\underline{t}_1$  and  $\underline{F}_1$  report the results of analyses in which the error terms were based on subject variability, and  $\underline{t}_2$  and  $\underline{F}_2$  report the results of analyses in which the error terms were based on item variability. Because there was a prior hypothesis as to the direction of the experimental effect, one-tailed tests were used in all analyses involving pairs of means.

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Table 2

Experiment 1 - Recognition latencies, reading times on last line (in ms), and error rates.

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<u>Condition</u>	<u>Recog. latency</u>	<u>Reading time</u>	<u>Error rate</u>
Inference	1112	1689	2.1%
Control	1167	1736	1.6%
Disconfirmed	1241	1688	5.0%

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<sup>1</sup> According to Tukey's criterion, a score,  $Y$ , is defined as an outlier if:  $Y > H_U + (1.5)(H_U - H_L)$  or  $Y < H_L - (1.5)(H_U - H_L)$ .  $H_U$  and  $H_L$  refer to the scores which cut off the upper and lower 25% of the ranked scores.



The recognition latencies differed significantly for the three conditions,  $F_1(2,74) = 7.663$ ,  $MSE = 36062.15$ , and  $F_2(2,34) = 3.208$ ,  $MSE = 31886.36$ . The most important finding was that the mean recognition latency was faster in the inference condition than the control. This effect was reliable for subjects:  $t_1(37) = 2.481$ ,  $SE = 2.22$ , and marginally reliable by items:  $t_2(17) = 1.524$ ,  $SE = 3.85$ ,  $p = .073$ . The mean latency was also reliably faster in the inference than in the disconfirmed condition,  $t_1(37) = 3.306$ ,  $SE = 2.89$ , and  $t_2(17) = 2.019$ ,  $SE = 4.17$ .

Error rates ("no" responses to the experimental recognition probes) differed across the three conditions,  $F(2,74) = 4.913$ ,  $MSE = .262$ . Error rates were about equal in the inference and control conditions,  $t < 1$ , but subjects made reliably more errors in the disconfirmed condition than in the inference condition,  $t_1(37) = 2.572$ ,  $SE = .135$  or in the control condition,  $t_1(37) = 2.589$ ,  $SE = .146$ .

The mean reading time on the last line of the passages did not differ significantly across conditions,  $F_1 < 1$ , and  $F_2(2,34) = 1.812$ ,  $MSE = 69529.91$ ,  $p = .179$ . Reading times were slower in the control condition than in either the inference or disconfirmed conditions but planned comparisons confirmed that reading times were not significantly longer in the control condition than in either the inference or disconfirmed conditions: (1) control vs. inference,  $t_1 < 1$ , and  $t_2(17) = 1.274$ ,  $SE =$

4.87,  $p = .11$ . (2) control vs. disconfirmed,  $t_1 < 1$ , and  $t_2(17) = 1.587$ ,  $SE = 4.83$ ,  $p = .066$ .

#### D. Discussion

The faster recognition latencies in the inference condition than in the control condition suggest that the targeted cause was more easily integrated with the inference version of the passages. This may have been the result of the targeted cause being reinstated while reading; or, when the probe was presented, it may have been checked against the passage and found to be more compatible when the inference version of the passage had been presented than when the control version had been presented.

The facilitation of the recognition response in the inference condition as compared to the disconfirmed condition is evidence against the simplest version of the context checking argument. The disconfirmed condition contained a coherence break in the final sentence as did the inference condition. If subjects were simply checking the compatibility of the probe word against the information in the last few sentences, there should have been no difference in response latencies. The finding of a difference can either be taken as evidence against context checking and in support of the conclusion that the targeted cause was reactivated while reading, or the slower recognition latency in the disconfirmed condition

may be viewed as evidence for a revised version of the context checking argument. According to this argument, subjects checked the compatibility of the probe word against the entire passage rather than the last few lines only. The probe word was equally compatible with the last few sentences in the inference and disconfirmed conditions but the inference that the bear was the cause of Bobby's fear was inconsistent with the disconfirmed elaboration: there were no live bears in the park.

Another explanation for the slower latencies in the disconfirmed condition is that the initial encoding of the elaboration region of the passage may have differed. There was an equal amount of text focusing on the bears in both conditions, but subjects may have elaborated on the information in the inference and control condition more than in the disconfirmed condition. For example, they may have wondered how badly the campers were hurt by the bears, how big the bears were, or if the boys might see a bear. This type of elaboration may have then led to the targeted cause being better integrated with the rest of the passage providing additional retrieval paths from the probe word to the elaboration. The elaboration in the disconfirmed condition is a "dead end," in Trabasso and Sperry's (1985) terms. It is not connected to any other part of the passage.

In the disconfirmed condition the slower latency is accompanied by a higher error rate, but this is not true in the control condition. The pattern of errors and of recognition latencies is consistent with a context checking interpretation. In the inference and control conditions the error rates are low; the probe word refers to a concept which was highly elaborated in the elaboration region of these passages. The recognition judgement is slower in the control condition because the probe does not fit with the final sentence of the passage. In the disconfirmed condition, recognition times are slower and error rates are higher. If the disconfirmed elaboration was less well integrated with the rest of the passage, readers would have been slower to locate the probed concept in the text representation. Readers may have also received conflicting signals because the probe word fit with the last few sentences of the passage but not with information presented earlier.

In sum, the facilitation in the recognition time in the inference condition provided evidence that readers found the targeted cause to be more compatible with the inference version of the passages than with the control or disconfirmed versions. Whereas the pattern of results suggests that the recognition probe encouraged a context checking strategy, this does not rule out the possibility that the targeted cause was also reactivated while

reading. In Experiment 2, a word naming probe was used to further investigate the reinstatement process by examining the process on-line.



## C H A P T E R VI

### EXPERIMENT 2

#### A. Introduction

The primary goal of the second experiment was to determine if readers reinstate backgrounded causal information in order to understand currently processed actions and events, as the reinstatement hypothesis claims, or if they wait until additional information is provided, as the wait-and-see hypothesis claims. Although the results of Klin & Myers (1993) provided evidence for the reinstatement hypothesis, the role of the 500 ms delay was unclear. A delay shorter than 500 ms is therefore necessary in order to determine if causal information is reinstated naturally in response to these types of passages.

In this experiment two probe delays were used: 250 ms and 500 ms. A delay shorter than 250 ms was not used because of evidence (Duffy, Henderson, and Morris, 1989) that subjects have difficulty switching tasks with very short delays. In addition, Neely (1977) found that a 400 ms SOA was not enough time to show facilitation from conscious expectations in a lexical decision task. Given these results, 250 ms is not enough time for readers to have drawn the inference in response to the probe.

Activation of a backgrounded concept at this delay is evidence against the wait-and-see hypothesis.

These materials were identical to those used in Experiment 1. Naming time on the probe word was the primary dependent measure instead of recognition latency. Reading time on the last line was also of interest. In the next section, several possible outcomes of the naming time results and the reading time results are discussed.

### 1. Inference vs. Control

It was expected that time to name the probe word would be facilitated in the inference condition relative to the control condition at the 500 ms delay. This was essentially a replication of Klin & Myers (1993) with a new control condition and slightly modified passages.

Facilitation of the probe word in the inference condition at the 250 ms delay would be evidence for the reinstatement hypothesis and against the wait-and-see hypothesis. It is unlikely that the targeted cause could be reinstated during the 250 ms delay, in response to the warning signal (XXX), given the results of several previous studies (Neely, 1977; Till et al., 1988). In these studies, delays longer than 250 ms were still too short for inferences to be drawn.

If there is no facilitation in the inference condition at the 250 ms delay, there are several possible explanations. The first is that the wait-and-

see hypothesis is correct and the effects found in Klin & Myers (1993) were a function of the procedure. In this view, additional processing occurred in response to the warning signal, and the targeted cause was reinstated during the 500 ms delay. The targeted cause may not have been reactivated without this blank period in which there was no incoming text to process.

The second and third explanations support the reinstatement hypothesis, rather than the wait-and-see hypothesis, and attribute the lack of facilitation at the 250 ms delay to the task. The second explanation for a lack of naming time facilitation at the 250 ms delay is that the probe interfered with normal processing. Duffy et al. (1989) found that subjects had difficulty switching from processing text in an RSVP paradigm to a naming task when a 250 ms warning was given before a probe word was presented. The third explanation is that it may take more time than was provided by the 250 ms delay to reactivate the backgrounded causal information. In normal reading, readers may not fully reactivate backgrounded causal information until several words past the point where they encounter a causal coherence break. This is a reasonable hypothesis given that eye movement data has shown that processing continues to be slow on the one or two words after an anaphor (Ehrlich & Rayner, 1983; Vonk, 1984).

In sum, if there is no naming time facilitation in the inference condition at the 250 ms delay, this may be because readers do not reinstate backgrounded causal information in normal reading, the probe interfered with processing, or more time was needed to reactivate backgrounded causal information. If this result obtains, these alternatives will be explored in additional experiments.

Based on the findings of Bloom et al. (1990) and van den Broek (1990), there is reason to expect longer reading times when backgrounded causal information is reinstated. A reading time effect was not present in Klin & Myers (1993), but this may have been due to differences in the last lines of the inference and control conditions. As noted, this is not a problem in this experiment because the last lines are identical in all three versions. Longer reading times on the last line in the inference condition would provide converging evidence that subjects had reinstated a backgrounded concept. According to the search hypothesis, time is needed to reinstate the causal information. Both the search and the resonance hypotheses predict that time may be needed to integrate this information with the focal sentence. Because of this, longer reading times in the inference condition than in the control condition will not distinguish between the search and the resonance



hypotheses. On the other hand, if there is facilitation in naming time in the inference version but no slow-down in reading, this is support for the resonance hypothesis.

## 2. Disconfirmed vs. Control

In the disconfirmed condition, the causal information is present but it has been changed to make it inappropriate as a cause for the action in the last line. This condition was included in Klin & Myers (1993), and no facilitation was found on the probe word against the control condition. It is expected that the time to name the probe word in the disconfirmed condition will also not be facilitated in this experiment as compared to the control condition at the 500 ms delay. The results in the disconfirmed version do not distinguish between the reinstatement and wait-and-see models, but they are important for several other reasons.

The first reason to include the disconfirmed condition is as an additional baseline against which to compare the inference condition. It has advantages over the control condition because passages in the inference condition and the disconfirmed condition are identical after the elaboration region of the passage. This eliminates concerns about spillover effects; there is no possibility that differences found in naming time are due to differences in the penultimate sentence.



The second reason to include the disconfirmed condition is to investigate the reason for the lack of facilitation in the disconfirmed condition in Klin & Myers (1993). One hypothesis was that the causal information (BEAR) was encoded in such a way that it no longer could act to resolve the coherence break and was therefore not reinstated: Whereas dangerous bears are a cause of running in fear, dead bears are not. If readers were actively searching the text representation for a cause of fear, bears may not have been selected in the disconfirmed condition. Similarly, if the process is a fast, resonance process, the traces in the target sentence (fear, danger) may not have overlapped sufficiently with traces in the disconfirmed elaboration. This predicts that there will be no facilitation in the disconfirmed version at the 250 ms or the 500 ms delay.

Alternately, the targeted cause may have been reactivated in response to the coherence break in the disconfirmed version but quickly suppressed. This is consistent with findings in the study of lexical ambiguity (Swinney, 1979). After a 250 ms interval, both meanings of a homograph were active but after 500 ms only the appropriate meaning remained active. Similarly, in studies of anaphoric inferences, Dell, McKoon, & Ratcliff (1983) found that concepts related to the anaphor were available after a 250 ms delay, but after 500 ms only the

antecedent remained active. In this experiment, if the causal information was reactivated in the disconfirmed condition but not subsequently integrated, there should be facilitation of the probe in the disconfirmed condition at the 250 ms delay.

The third reason for including the disconfirmed condition is that it addresses questions about the underlying process involved in the reinstatement of backgrounded information. If naming times and reading times are the same in the disconfirmed and the control conditions, this is evidence against Fletcher and Bloom's current-state model and van den Broek's CIM. These models propose that a search through the text representation occurs each time there is a coherence break; therefore reading times should be longer in the disconfirmed condition which contains a coherence break than in the control condition which does not.

## B. Method

### 1. Subjects

Ninety-five undergraduates at the University of Massachusetts at Amherst participated in exchange for extra credit in a psychology class. Subjects making more than 10% errors on comprehension questions were excluded. This led to the elimination of six subjects.

## 2. Materials

The experimental materials are the same as those that were used in Experiment 1. A sample passage is presented in Table 1, in the inference, control, and disconfirmed conditions.

There were twenty-two filler items. These were included primarily so that subjects would be unaware of the purpose of the experiment. They ranged in length from six to 17 lines and they did not contain coherence breaks. Some of the filler items ended in the middle of a sentence. This was done so that subjects did not expect a probe word to appear after lines which ended with a period. The probe words for the filler items came from various locations within the passage or were words which did not appear in the passage.

## 3. Design

For each subject the experimental passages were randomly assigned to the inference, control, and disconfirmed conditions with two constraints: (1) each subject saw a third of the passages in the inference version, a third in the control, and a third in the disconfirmed; and (2) each version of each passage was presented to one third of the subjects. Filler trials were interspersed among the experimental trials.

There were two delays, 250 ms and 500 ms. Delay was a between-subjects variable so the delay was constant for

each subject. There were 48 subjects in the 250 ms delay group and 42 subjects in the 500 ms delay group.

#### 4. Procedure

The procedure was identical to that of Experiment 1 until the point at which the passage ended. When subjects pressed the line advance key after the last line of the passage the string XXX was presented for either 250 ms or 500 ms. Subjects did not know they were at the end of the passage until this cue was presented. This was replaced by the probe word in capital letters. Subjects were instructed to name the word out loud as quickly as possible. After the subject named the word, it was erased from the screen. Subjects received feedback about their naming time. This was followed the string ??? for 500 ms. and then replaced by a comprehension question.

### C. Results and Discussion

#### 1. Naming times

The mean naming times for each of the three conditions at both of the delays are presented in Table 3. Averaging over the three conditions, subjects were 5 ms faster at the 500 ms delay than at the 250 ms delay. This difference was not reliable by subjects,  $F < 1$ , but it was reliable by items,  $F_2(1,17) = 4.659$ ,  $MSE = 187.857$ . At the 500 ms delay there was more time to shift attention from the reading task to the naming task.



Readers may have been more prepared for the presentation of the probe. Averaging over delay, the order of the means was the same as in Experiment 1: Subjects were fastest in the inference condition, followed by the control condition, and finally they were slowest in the disconfirmed condition. This difference was highly reliable by subjects,  $F_1(2,86) = 4.430$ ,  $MSE = 9067.561$ , but not by items,  $F_2(2,34) = 1.445$ ,  $MSE = 421.691$ ,  $p = .250$ . The primary effect of interest is the differences in naming time for the three conditions for each of the delays. The naming time results at the 250 ms delay will be discussed first.

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Table 3

Experiment 2 - Average naming times and (last line reading times) in ms.

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<u>Delay</u>	<u>Inference</u>	<u>Control</u>	<u>Disconfirmed</u>	<u>Mean</u>
250 ms	444 (1769)	447 (1800)	457 (1766)	449 (1778)
500 ms	440 (1731)	447 (1820)	446 (1759)	444 (1770)
<u>Mean</u>	442 (1751)	447 (1810)	452 (1762)	

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a. 250 ms. delay

Outliers (Tukey, 1977), 2.3% of the naming time data, were discarded. In addition, the data from one subject were discarded because of an outlying difference score.

The order of the naming time means was the same as it was with the two delays combined: Subjects were fastest in the inference condition, followed by the control, and they were slowest in the disconfirmed. The difference between the three conditions was reliable by subjects,  $F_1(2,92) = 4.904$ ,  $MSE = 387.446$  but not by items,  $F_2(2,34) = 1.667$ ,  $MSE = 318.12$ ,  $p = .204$ . What is unique to this delay is that there was a sizable difference between the two baseline conditions, the control and the disconfirmed conditions. This was highly reliable by subjects,  $t_1 = 2.470$ ,  $SE = .729$ , but not by items,  $t_2 < 1$ . Because of the difference in the two baseline conditions, the interpretation of these results depends on which condition, the control or the disconfirmed, is considered the appropriate baseline. Although the average time was slightly faster in the inference condition than in the control condition, this difference did not nearly reach significance,  $t$ 's  $< 1$ . In contrast, naming latencies were facilitated in the inference condition when measured against the disconfirmed condition,  $t_1 = 2.820$ ,  $SE = .795$ , and  $t_2 =$

2.332,  $SE = 1.050$ . Due to the difficulty in interpreting this pattern of results, the effects at the 250 ms delay were investigated again in Experiment 3. Discussion of the present results will be postponed until Experiment 3 has been presented.

b. 500 ms. delay

Next, consider the mean naming times at the 500 ms delay. At this delay, outliers (Tukey, 1977) comprised 1.2% of the data and were discarded. The difference in naming time was not reliable between the three conditions,  $F_1(2,80) = 1.268$ ,  $MSE = 431.453$ ,  $p = .287$ , and  $F_2 < 1$ . In comparison to the naming times results at the 250 ms delay, choosing an appropriate baseline was not an issue because the means in the control and the disconfirmed conditions were practically identical. The results were somewhat ambiguous nonetheless because of the marginally reliable difference between the inference and control condition. Only by subjects does the effect approach significance,  $t_1(40) = 1.436$ ;  $SE = .850$ ,  $p = .079$ ,  $t_2 < 1$ . Comparing the inference and disconfirmed conditions,  $t_1(40) = 1.159$ ,  $SE = .8905$ ,  $p = .127$ , and  $t_2(17) = 1.07$ ,  $SE = 1.112$ ,  $p = .150$ . The lack of a significant difference between the inference and control conditions was surprising, given that this was essentially a replication of the three experiments in Klin & Myers (1993). The procedure was identical,

although the passages had been modified. One possible reason for the discrepancy in findings is that there was less elaboration of the targeted cause in the present experiments. For example, there were fewer sentences referring to the bears and the dangers they posed. Given either the search or the resonance model, elaboration should play an important role. Elaboration was shown to facilitate the reinstatement of anaphoric antecedents, for example, in O'Brien et al. (1990). Increasing the elaboration should increase the number of relevant traces and the probability that they are encoded. This issue will be explored further in Experiment 3.

## 2. Reading times

The average reading times for the last lines of the passages are presented in Table 3. Averaging over the three conditions, the average reading times did not differ significantly at the two delays,  $F_1 < 1$ , and  $F_2(17) = 1.169$ , MSE = 18831.240,  $p = .295$ . Averaging over delay, reading times were similar in the inference and disconfirmed conditions, and slower in the control. The difference in the means in the three conditions was reliable by subjects,  $F_1(2, 172) = 2.667$ , MSE = 33629.768, but not by items,  $F_2(2, 34) = 2.195$ , MSE = 74676.029,  $p = .127$ . This difference was due to the slower reading time in the control condition than in the inference condition,  $F_1(2, 86) = 4.460$ , MSE = 36167.864,

and  $F_2(2,34) = 3.002$ ,  $MSE = 83065.361$ ,  $p = .101$ , and to the slower reading time in the control condition than in the disconfirmed,  $F_1(2,86) = 2.784$ ,  $MSE = 36643.513$ ,  $p = .099$ , and  $F_2 < 1$ .

None of the reading time differences between conditions were significant at the 250 ms delay. At the 500 ms delay the difference in reading times across the three conditions was reliable by subjects,  $F_1(2,80)=3.60$ ,  $MSE = 23,957.436$ , but not by items,  $F_2(2,34) = 1.204$ ,  $MSE = 49,708.019$ ,  $p = .157$ . In planned comparisons, the mean reading time in the control condition was reliably longer than the mean reading time in either the inference or the disconfirmed condition in an analysis by subjects, but not by items at the 500 ms delay: (1) control vs. inference,  $t_1(40) = 2.355$ ,  $SE = 2.45$ , and  $t_2(17)= 1.256$ ,  $SE = 4.33$ ,  $p = .11$ . (2) control vs. disconfirmed,  $t_1(40) = 1.831$ ,  $SE = 2.29$ , and  $t_2(17)= 1.342$ ,  $SE = 4.18$ ,  $p = .10$ .

The longer reading time in the control condition than in the inference and disconfirmed conditions is surprising. This effect was not reliable at the 250 ms delay, nor was it significant at either the 250 ms delay or the 500 ms delay in Experiment 3, so it will not be discussed further. Based on earlier findings (Bloom et al., 1990; van den Broek, 1990) there was reason to expect longer reading times in the inference condition



than in the control condition, presumably reflecting inferential processing. This was not the case in any of the experiments in Klin & Myers (1993); however, the last lines differed across passages. The lack of the expected difference in reading time in the inference and control conditions may have reflected the influence of variables such as syntax and word frequency. This, however, does not explain the lack of a reading time difference in this experiment because all of the versions of the passages contained the same last line. The absence of a reading time difference will be discussed further following the presentation of the results of Experiment 3.

In sum, the results of Experiment 2 are somewhat ambiguous. There was evidence of the reactivation of backgrounded causal information at the 500 ms delay, although this result was only suggestive. At 250 ms, the interpretation was complicated by the fact that mean naming times were reliably different for the two baseline conditions, the control and disconfirmed conditions. The interpretation of the effects depends on which of these conditions is taken to be the true baseline. These issues will be considered further in Experiment 3.



## C H A P T E R VII

### EXPERIMENT 3

#### A. Introduction

This experiment was conducted in an attempt to provide a stronger test of the reinstatement and wait-and-see hypotheses. The procedure and design were identical to that in Experiment 2. The passages were revised so that there was additional material in the elaboration region. If evidence cannot be found for the reinstatement of backgrounded information when conditions are optimal it will be safe to conclude that under most circumstances, readers do not reinstate information in response to causal coherence breaks.

If there still is no facilitation in the inference condition at the 500 ms delay with the additional elaboration, the question is whether there are any conditions under which readers draw causal inferences, short of being instructed to do so. If there is facilitation at the 500 ms delay, but not at 250 ms, the question of the role of the delay remains. Finally, if there is facilitation at both the 250 ms delay and the 500 ms delays, this is evidence for the reinstatement hypothesis. The question which will need to be addressed is what role the additional elaboration played and what

constraints this places on a theory of causal reinstatement in the processing of text.

## B. Method

### 1. Subjects

Eighty-four undergraduates at the University of Massachusetts at Amherst participated in exchange for extra credit in a psychology class. Subjects making more than 10% errors on comprehension questions were excluded. This led to the elimination of two subjects.

### 2. Materials

The elaboration section of the passages used in Experiments 1 and 2 were modified by adding material. The inference, control, and disconfirmed versions of a sample passage can be found in Table 4. (The full set of materials can be found in Appendix B.) There was an average of 60 words in the elaboration section, ranging from 39 to 99 words, as compared to an average of 32 words in Experiment 2.

### 2. Design and Procedure

The design and procedure were unchanged from Experiment 2. There were 28 subjects at the 250 ms delay and 54 subjects at the 500 ms delay.<sup>2</sup>

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<sup>2</sup> Only 28 subjects were run at the 250 ms delay because the pattern of results replicated the results in Experiment 2: naming times were not facilitated in the inference condition as compared to the control condition. Due to time constraints, no additional subjects were run.

Table 4

Experiment 3 - Sample passage.

#### INTRODUCTION

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He talked about the plants and animals they might see.

#### ELABORATION

Inference and Control conditions

He warned them to be careful of bears.

One had recently attacked some campers in the woods and they had been badly hurt. Several boy scout troops had canceled their plans because they were afraid of the danger that the bears presented. The ranger told the boys what to do if they should spot a bear.

Disconfirmed condition

He told them to be careful whenever they went exploring. There used to be bears in the woods but they had all been moved out of the park. A few years ago several campers had been badly hurt by a bear. That's when they finally trapped the bears and moved them far away where they weren't a threat.

#### BACKGROUNDING

The ranger then gave each of the boys a map and showed them the location of their campsite. Bobby and his friend Tim found theirs with no trouble. They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire. Minutes

#### PENULTIMATE LINE

Control condition

later, Tim saw Bobby being chased by a big bee.

Inference and Disconfirmed conditions

later, Tim saw Bobby coming back to the campsite.

#### LAST LINE

He was running hard, obviously very frightened.

#### PROBE

BEAR

### C. Results

#### 1. Naming time

Table 5 shows the mean naming times for each of the three conditions at both of the delays. Outliers (Tukey, 1977), 1.2% of the data, were excluded. In addition, two subjects were dropped because of outlying difference scores.

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Table 5

Experiment 3 - Average naming times and (last line reading times) in ms.

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<u>Delay</u>	<u>Inference</u>	<u>Control</u>	<u>Disconfirmed</u>	<u>Mean</u>
250 ms	440 (1470)	446 (1493)	451 (1477)	446 (1481)
500 ms	423 (1517)	436 (1499)	431 (1475)	430 (1497)
<u>Mean</u>	429 (1501)	439 (1497)	438 (1476)	

---

Averaging over the three conditions, subjects were 16 ms faster at the 500 ms delay than at the 250 ms delay. As in Experiment 2, this difference was not reliable by subjects,  $F_1(1,80) = 2.543$ , MSE = 5617.250,  $p = .115$ , but it was reliable by items,  $F_2(1,17) = 9.464$ ,



MSE = 520.899. The difference in the means at the two delays resembles the results of Duffy et al. (1989) who found that subjects had difficulty switching from a reading task to a naming task when a 250 ms warning was given.

Averaging over delay, naming times were faster in the inference condition than those in the control and disconfirmed conditions, which were about equal. The difference between the three conditions was reliable by subjects,  $F_1(2,160) = 4.333$ , MSE = 545.234, but not by items,  $F_2(2,34) = 1.238$ , MSE = 592.746,  $p = .303$ . The mean for the inference condition was significantly faster than for either the control condition or the disconfirmed condition in an analysis by subjects, but not by items:

(1) Inference vs control,  $F_1(2,80) = 9.212$ , MSE = 370.156, and  $F_2(2,17) = 1.734$ , MSE = 732.568,  $p = .205$ .

(2) Inference vs. disconfirmed,  $F_1(2,80) = 5.960$ , MSE = 616.231, and  $F_2(2,17) = 1.997$ , MSE = 454.560,  $p = .178$ .

The interaction between delay and condition was far from significant,  $F$ 's < 1.

#### a. 250 ms delay

The primary results of interest are the differences between the conditions at each of the delays. At the 250 ms delay the difference in naming time across conditions was not significant,  $F_1(2,54) = 1.322$ , MSE = 671.490,  $p = .275$ , and  $F_2 < 1$ . The order of the naming time means was



the same as in the 250 ms condition of Experiment 2, although the magnitude of the differences was not. Subjects continued to respond most quickly in the inference condition, followed by the control condition, and finally they were slowest in the disconfirmed condition. As in Experiment 2, naming times were faster in the control condition than in the disconfirmed condition, but in this experiment this difference was not significant,  $t$ 's  $< 1$ .

The most important finding was that the mean naming time was faster in the inference than in the control condition, as it was in Experiment 2, but this difference failed to reach significance,  $t_1(27) = 1.157$ ,  $SE = 1.03$ ,  $p = .129$ , and  $t_2 < 1$ . There is some evidence of facilitation in the inference condition against the baseline of the disconfirmed condition. The difference between the inference condition and the disconfirmed conditions was marginally reliable by subjects,  $t_1(27) = 1.481$ ,  $SE = 1.22$ ,  $p = .075$ , but not by items,  $t_2 < 1$ . Considering the data from Experiments 2 and 3 together for the 250 ms delay, there was no interaction of effect size (inference vs. control) by experiment ( $F < 1$ ). Because of the increase in power, the difference between the inference and control condition naming time means in this combined analysis was closer to significance by subjects,  $F_1(1,73) = 1.885$ ,  $MSE = 403$ ,  $p = .087$ , but was

still not significant by items,  $F_2 < 1$ . The trend for naming times to be faster in the inference condition than in the control condition at the 250 ms delay in both Experiments 2 and 3 suggests that the 500 ms delay might not be necessary for the reactivation of backgrounded information. This finding is far from conclusive. This issue will be explored further in Experiment 4 with a different methodology.

b. 500 ms delay

The naming time results at 500 ms were clear. The difference between the three conditions was highly reliable:  $F_1(2,106) = 4.895$ ,  $MSE = 480.916$ , and  $F_2(2,34) = 3.781$ ,  $MSE = 208.154$ . The mean naming time in the inference condition was significantly faster than in either the control or the disconfirmed conditions. Contrasting the inference and control conditions,  $t_1(53) = 3.604$ ,  $SE = .699$ , and  $t_2(17) = 2.313$ ,  $SE = 1.58$ . Contrasting the inference and disconfirmed conditions,  $t_1(53) = 1.989$ ,  $SE = .773$ , and  $t_2(17) = 1.579$ ,  $SE = 1.08$ . The control condition mean naming time was faster than the disconfirmed condition mean, although not reliably so:  $t_1 < 1$ , and  $t_2(17) = 1.502$ ,  $SE = .921$ ,  $p = .076$ .

This replicates the pattern of results found in Klin & Myers (1993). With the additional elaboration, there was evidence that the targeted cause was reactivated in response to the causal coherence break in the inference

condition at the 500 ms delay. When data are combined from Experiments 2 and 3 at the 500 ms delay, there was no interaction of effect size by experiment even though the difference between the inference and control naming times was larger in Experiment 3 with the additional elaboration;  $F_1(1,93) = 1.192$ ,  $MSE=388$ ,  $p = .139$ , and  $F_2(1,17) = 1.795$ ,  $MSE = 226$ ,  $p = .104$ . There is a reliable difference between the inference and control condition mean naming times when the two experiments are combined,  $F_1(1,93) = 11.546$ ,  $MSE = 4475$ , and  $F_2(1,17) = 2.924$ ,  $MSE= 446$ ,  $p = .053$ .

## 2. Reading time

At both the 250 ms and the 500 ms delays in this experiment, the mean reading times on the last line of the passages did not differ across the three conditions, all  $F$ 's < 1.

## D. Discussion

The lack of facilitation in the disconfirmed condition at the 250 ms delay in both Experiments 2 and 3 is evidence against the possibility raised earlier that there was some short-lived reactivation of the causal information because of the coherence break. Admittedly, there is some possibility that the 250 ms delay was still too long, and that activation might be found at a yet shorter delay. A more plausible explanation, however, is that the disconfirmed elaboration was encoded in a way

that made it an unlikely cause of the action in the coherence break.

The results in the inference condition at the 250 ms delay remain somewhat ambiguous. The mean naming time was faster in the inference condition than in the control and the disconfirmed conditions, but these results were not always reliable. The faster mean naming time at the 500 ms delay than at the 250 ms delay suggests that a 250 ms delay might be problematic, either because the probe interfered with processing, or because the process of reactivating backgrounded information takes more time than this delay allows. According to this interpretation, the results at the 250 ms delay do not pose a problem for the reinstatement hypothesis. This issue is explored further in Experiment 4.

At the 500 ms delay, there was evidence of reinstatement of the targeted backgrounded information. This difference was reliable in Experiment 3 with the addition of elaboration, reliable when the naming time data from Experiments 2 and 3 were combined, and in the right direction in Experiment 2. The question is whether this additional elaboration was simply helpful or if it was necessary. One possible influence of the elaboration is that the causal information remained foregrounded. Readers may not have reactivated backgrounded information when they encountered the coherence break, but just



integrated information which had stayed in working memory.

There are two pieces of evidence against this foregrounding hypothesis. One argument against this hypothesis is that text analyses, based on the Kintsch and van Dijk (1978) and the Fletcher and Bloom (1988) models, indicated that the targeted cause was backgrounded when the final sentence was read. The second argument against the foregrounding hypothesis is that Myers et al. (accepted pending revision) found that a highly elaborated proposition was no longer active after a section of backgrounding material, with passages similar in length and composition to passages in these experiments. Despite these arguments, the foregrounding hypothesis should be investigated experimentally with the materials of the present experiments.

An alternative to the foregrounding hypothesis is that the presence of the additional elaboration increased the likelihood that the causal information was encoded initially. The elaboration also may have made it easier to retrieve that information by increasing the number of overlapping traces in the focal sentence and the targeted cause. This alternative is consistent with both the search and the resonance hypotheses. The additional elaboration may have either increased the resonance of



the backgrounded information or facilitated the search process.

Whereas the additional elaboration may have been necessary for the reinstatement in these particular passages, a number of other variables would probably have been equally successful in facilitating the reinstatement process. For example, decreasing the distance between the targeted cause and the focal sentence should strengthen the resonance of backgrounded traces. A more severe coherence break might also enhance the effect. If the target line were completely anomalous, for example, readers might be less willing to read on without resolving the anomaly. Variables such as these should interact with elaboration so that a targeted cause might be reinstated in a passage with a severe coherence break but without much elaboration.

The lack of a slow-down in reading time on the last line in the inference condition compared with the control condition has been found consistently. This is in contrast to previous findings (Bloom et al., 1990; van den Broek, 1990), as well as the expectation that inferential processing would be reflected by longer reading times. The lack of an increase in reading time may be taken as support for a fast, direct access process and evidence against a slow, strategic search of the text representation.

A second explanation for the lack of a reading time difference is that in Klin & Myers (1993), differences in the last lines in the control and inference conditions contributed to the null results. In the present experiments, a "bridging" inference (Haviland & Clark, 1974) was actually required in the control condition. The information in the penultimate line, Bobby being chased by bees, for example, is not explicitly given as the cause for Bobby running in fear. This bridging inference, while presumably not a highly time consuming inference, may have increased reading time somewhat in the control condition.

## C H A P T E R   V I I I

### EXPERIMENT 4

#### A. Introduction

Several investigators have discussed the difference between activation and encoding (Corbett & Doshier, 1978; O'Brien, Shank, Myers, & Rayner, 1988; Kintsch, 1988; McKoon and Ratcliff, 1980; Potts et al., 1990). The word naming measure only determines if a concept is active. The facilitation in naming the probe word BEAR, for example, demonstrates that this concept has become reactivated. It can be argued that an inference is more than just momentary activation of a single concept. Experiment 4 was designed to investigate if the activated information was also integrated with the text and if the inference consisted of more than a single concept. As Keenan et al. (1990) point out, there are a variety of ideas about what constitutes an inference, from an activated concept to a whole proposition to an entire structure such as a schema.

There were two versions of each passage: a control version and an inference version. A sample passage can be found in Table 6. (The complete set of materials are provided in Appendix C.) In the control condition the elaboration was replaced by material that was neutral

Table 6

Experiment 4 - Sample passage.

INTRODUCTION

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He talked about the plants and animals they might see.

ELABORATION

Inference condition

He warned them to be careful of bears. One had been attacked some campers in the woods and they had been badly hurt. Several boy scout troops had canceled their plans because they were afraid of the danger that the bears presented. The ranger told the boys what to do if they should spot a bear.

Control condition

He warned them to be careful of poison ivy. Some campers had recently been exposed to some when they set up their tents next a whole field of poison ivy plants. A few of the campers had even gone home early because they had such bad cases. The ranger told the boys how to spot poison ivy and how to avoid it.

BACKGROUNDING

The ranger then gave each of the boys a map and showed them the location of their campsite. Bobby and his friend Tim found theirs with no trouble. They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire. Minutes later, Tim saw Bobby coming back to the campsite.

PRE-TARGET

He was running hard, obviously very frightened.

TARGET

Several bees were chasing him.

POST-TARGET

He looked really panicked.

with respect to the coherence break. In the sample passage the forest ranger warns the boys to be careful of poison ivy. In the inference version the elaboration is the same as in Experiment 3. A target line was added to the passages which contradicted the potential inference in the inference condition. For example, in the sample passage, the target line was "Several bees were chasing him." This contradicts the inference that Bobby was running because he had seen a bear. Only if subjects have reactivated the targeted cause (BEAR) in the inference version, used this concept to form a proposition which resolves the coherence break (He has seen a bear), and maintained the proposition in working memory, should there be a slow down in reading on this line. On the other hand, if the effects found in Klin & Myers (1993) and in Experiments 2 and 3 at the 500 ms delay are the result of the momentary reactivation of a single concept, the target line will not cause a slow down in reading. In the control condition, there was no basis for subjects to resolve the causal coherence break and the target line provide a reasonable continuation.

Another goal of this experiment was to distinguish between the two alternative explanations for the lack of clear naming time facilitation at the 250 ms delay in Experiments 2 and 3. The first explanation for this effect was that readers needed more time to reactivate



the targeted cause, possibly because of interference caused by the probe or simply because the process takes time. Time may be needed either to locate the backgrounded information or to integrate this information with the current input. In either case, in the current experiment there should be longer reading times on the target line in the inference condition than in the control condition. There is no probe word to interfere with processing, and the contradiction in the target line does not occur until several words past the end of the sentence with the coherence break.

The second explanation for the lack of an effect at 250 ms was that readers do not reinstate causal information, as predicted by the wait-and-see hypothesis. According to this interpretation, the 500 ms of blank time freed readers' attentional resources or acted as a cue to review the passage, and therefore was necessary for the reinstatement effect. If this hypothesis is correct, readers will not reinstate the causal information in the present experiment because there is no delay after the sentence with the coherence break. Consequently there should be no slow-down on the target line.

## B. Method

### 1. Subjects

Fifty-two undergraduates at the University of Massachusetts at Amherst participated in exchange for extra credit in a psychology class. Subjects making more than 10% errors on comprehension questions were excluded. This led to the elimination of five subjects.

### 2. Materials

A sample passage can be found in Table 6. (The complete set of materials can be found in Appendix C.) The inference condition is the same as the inference condition from Experiments 1, 2 and 3, with one modification. Two lines were added to the end of the passage. The target line contradicts the targeted inference. In the sample passage in Table 6, the target line is inconsistent with the inference that Bobby is running in fear because he has seen a bear. The target line was not inconsistent with any of the information in the passage which was stated explicitly. The post-target line was neutral with respect to the action in the target line. The post-target line was included because there are several studies (Albrecht & O'Brien, in press; Huitema et al., in press; Myers et al., accepted pending revision) in which reading times on a post-target line were significantly slower in passages which contained a contradiction in the target line. Passages in the

control condition differed from the inference condition in the elaboration section. The elaboration was replaced by material which was neutral with respect to the target line. Both versions of the elaboration region were the same length and contained the same number of sentences.

### 3. Design

The design was the same as that of Experiments 2 and 3 with two modifications: The disconfirmed condition was not included, and there was no between-subjects variable.

### 4. Procedure

The procedure was also similar to that of Experiments 2 and 3. The only difference was that no probe word was presented at the end of the passage.

## C. Results

The reading time results for the pre-target, target, and post-target lines are presented in Table 7. These values were computed after discarding outliers as defined by Tukey's (1977) criterion; this eliminated 1.5% of the data.

### 1. Target line

The results were straightforward. Subjects read the target line more slowly when it was inconsistent with the causal inference. The 73 ms slow-down in the inference version is reliable both by subjects,  $t_1(46) = 3.049$ ,  $SE = 1.86$ , and by items,  $t_2(17) = 1.843$ ,  $SE = 3.84$ .

---

Table 7

Experiment 4 - Reading times (in ms).

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	<u>Inference</u>	<u>Control</u>	<u>Difference</u>
Pre-target	1615	1629	-13
Target	1802	1729	73
Post-target	1519	1456	63

---

## 2. Post-target line

Subjects also read the post-target line more slowly in the inference condition than in the control condition. The difference was 63 ms, compared with the 73 ms effect on the target line, and it was more variable. The difference was reliable by subjects but not by items:  $t_1(46) = 1.666$ ,  $SE = 2.35$ , and  $t_2(17) = 1.123$ ,  $SE = 3.69$ ,  $p = .139$ .

## 3. Pre-target line

The pre-target line was the last line in Experiments 1, 2 and 3. The reading times were practically identical on this line in the inference and control conditions. This is not surprising, given the consistency of this finding in the previous experiments.



#### D. Discussion

Taken together, the results provide strong support for the reinstatement hypothesis. Not only was a single backgrounded concept reactivated, but an entire proposition was added. This proposition was maintained in working memory, and it influenced the processing of the two sentences which followed.

These results also provide clarification of the results at the 250 ms delay. Whereas it is not clear if the probe interfered with processing or if reactivation took more time than was allotted, this experiment provides evidence against the wait-and-see hypothesis. Even without the presence of the 500 blank interval, the backgrounded causal information was reactivated and used to resolve the coherence break. This occurred even though the subjects had the option of reading on.

In sum, in the second and third experiments, naming time was used to demonstrate activation of backgrounded causal information. In Experiment 4, reading time was used to demonstrate that this activated information was also maintained in working memory. In Experiment 5, a recall test was used to explore the effect of the process of reinstating backgrounded causal information on the LTM representation.

## CHAPTER IX

### EXPERIMENT 5

#### A. Introduction

A number of studies have demonstrated that propositions which lie on the causal chain of a story are better remembered than those that do not (Black & Bower, 1980; Omanson, 1982; Trabasso & van den Broek, 1985). In addition, it has been demonstrated that causally related sentences are better recalled than sentences which have been studied in the context of other unrelated sentences (Bradshaw & Anderson, 1982), or other temporally related sentences (Black & Bern, 1981; Myers, O'Brien, Balota, & Toyofuku, 1984). But what about memory for sentences related by a causal connection which has not been explicitly provided in the passage? In several studies (Keenan et al., 1984; Myers et al., 1987; Duffy et al., 1990), better recall was found for sentence pairs which were moderately causally related than for sentence pairs with a high or low level of causal relatedness. Myers et al. (1987) and Duffy et al. (1990) hypothesized that the improvement in memory for the moderately related pairs was due to the additional elaboration needed to find a causal link between the first and second sentence in the pair. According to their view, the elaboration in the

moderately related pair created a more integrated text representation with additional retrieval routes. In the high related pair, this elaboration was not necessary and in the low related pair the elaboration was unsuccessful because there was no obvious causal link. The finding of improved recall, even after a delay, provided evidence that the inferred causal link was included in the LTM representation of the texts.

There is an important difference between the current materials and the sentence pairs used in these recall studies. After reading the second sentence in a pair, subjects knew that additional information would not be provided. In order to make sense of the text they had to infer a causal link. In the present studies subjects had the option of waiting for a causal link to be provided explicitly. The question is whether the causal link is encoded in the LTM representation even when subjects do not know that they are at the end of text.

Another question is how the reinstatement of backgrounded text influences the memory for the rest of the passage. Given a search model, there should also be improved memory for propositions which were encountered during the search for a sufficient cause. For example, there might be better recall in the inference condition for the backgrounding material or for the introduction because these propositions were reviewed as readers

searched their memory representation for a cause. On the other hand, if the reinstatement process involves the direct accessing of the targeted cause, propositions other than the targeted causal proposition should be unaffected by the reinstatement. Even assuming a direct access model, it is not clear if readers only make contact with the specific information needed to resolve the coherence break (for example, that there were dangerous bears,) or if related propositions also become reactivated (for example, other troops had canceled their plans). Finding improved recall for the targeted cause but for no other portion of the text would be strong support for a direct access account of the reinstatement process. Improved recall for the entire elaboration region would be expected either if readers reactivated all of the information about the bears when they encountered the causal coherence break, or if the targeted cause acted as a recall cue for the rest of the elaboration region at the time of test.

## B. Method

### 1. Subjects

Forty-eight undergraduates at the University of Massachusetts at Amherst participated in exchange for extra credit in a psychology class. Two subjects were excluded because they confused two or more of the 12 passages in the recall portion of the experiment.

## Table 8

Experiment 5 - Sample passage.

### INTRODUCTION

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He talked about the plants and animals they might see.

### TARGETED CAUSE

He warned them to be careful of bears.

### ELABORATION

One had recently attacked some campers in the woods and they had been badly hurt. Several boy scout troops had canceled their plans because they were afraid of the danger that the bears presented. The ranger told the boys what to do if they should spot a bear.

### BACKGROUND

The ranger then gave each of the boys a map and showed them the location of their campsite. Bobby and his friend Tim found theirs with no trouble. They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire.

### PENULTIMATE LINE

Inference condition

Minutes later, Tim saw Bobby coming back to the campsite.

Control condition

Minutes later, Tim saw Bobby being chased by a big bee.

### CAUSAL COHERENCE BREAK

He was running hard, obviously very frightened.

### CONCLUSION

Tim went out to meet him.



## 2. Materials

The inference and control versions of the passages from Experiments 2 and 3 were used, with two modifications. The first modification was that the probe was eliminated. The second was that a sentence was added to the end of the passage so that the passages ended in a less abrupt manner. This final sentence was neutral with respect to the action in the causal coherence break. In order to keep the experimental session under one hour, six of the original 18 passages were dropped. There were no filler passages.

## 3. Design

There were two orders of presentation, with half of the subjects reading the passages in each of the two orders. There were four assignments of passages to condition (inference or control), with one-quarter of the subjects receiving each assignment. All subjects saw six passages in the control condition and six in the inference condition. Across subjects, each passage appeared equally often in the two conditions.

## 4. Procedure

Subjects were told that there were two parts to the experiment, but they were not told that they would be given a recall test. The reading portion of the experiment was identical in procedure to Experiment 4. After subjects finished reading the passages, they were

told that they were to remember as much as they could about the stories they had just read. They were given a recall booklet with a cue for each passage. The cue was one or two sentences from the introduction, or a paraphrase. For example the cue for the sample passage was "Bobby and Timmy went camping with the boy scouts." The passages were recalled in the same order as they had been read. Subjects took between 30 and 50 minutes to complete this task.

### C. Results

Each passage was broken down into idea units (e.g. Trabasso & Sperry, 1985; Albrecht & O'Brien, in press). These idea units were then grouped into six regions. A sample passage, divided into the six regions, can be found in Table 8. The elaboration section from Experiments 2, 3 and 4 was split into two sections, the targeted cause and the elaboration. The targeted cause was the one sentence which most directly provided a cause for the action in the causal coherence break, for example, "He warned them to be careful of bears." The elaboration region contained the rest of the text which elaborated on the bears and the threats they posed. The conclusion consisted of one or two sentences which were added after the coherence break. Each region had a different number of idea units, and within a region the number of idea units differed across passages. Because

of this, recall is discussed in terms of proportion of idea units recalled. Subjects were given credit for an idea unit if their recall captured the gist. One rater scored all of the recall protocols and a second rater scored approximately one-third of the protocols (715 of the regions). Interrater reliability was 92.3%. Disagreements were resolved through discussion.

The mean proportion of idea units recalled for each region in the inference and control conditions is presented in Table 9. Collapsing over condition, the difference in proportion recalled differed significantly between regions,  $F_1(5,205) = 105.391$ ,  $MSE = .017$ . The highest recall was for the targeted cause; on the average, 86% of the idea units were recalled. This is not surprising, given the amount of elaboration about the targeted cause in these passages. The region with the lowest recall was the conclusion, with only 23.8% recalled. This region consisted of only one or two sentences, and they were not well integrated with the rest of the passage.

Table 9

Experiment 5 - Percent recalled.

(\*  $p < .05$ )

<u>Region</u>	<u>Inference</u>	<u>Control</u>	<u>Mean</u>	<u>I - C</u>
Introduction	43.2	45.4	44.3	-2.2
Targeted cause	88.5	83.5	86.0	5.0*
Elaboration	40.8	40.3	40.5	.5
Background	47.4	48.0	47.7	-.6
Causal coh. break	67.0	38.7	52.9	28.3*
Conclusion	28.3	19.3	23.8	9.0*
Mean	52.5	45.9		6.6

Averaging over regions, subjects recalled a greater proportion of idea units in the inference condition than in the control condition,  $F(1,41) = 29.194$ ,  $MSE=.019$ . This difference in recall between conditions was not consistent across regions. The interaction of version (inference or control) and region was significant,  $F(5,205) = 15.302$ ,  $MSE=.018$ . Examining the individual regions of the passages, there were three regions for which there was better recall in the inference condition than for the control condition: the targeted cause, the coherence break, and the conclusion. The largest

difference between conditions in the percentage which was recalled was in the coherence break region; 28.3% more idea units were recalled in the inference condition than in the control condition in this region. This difference was highly significant,  $F(1,38) = 64.775$ ,  $MSE=.028$ .

Another way of viewing this difference is by comparing the percentage which was recalled in the coherence break region against the other regions for each condition. In the control condition the coherence break region was not better recalled than the introduction (45.4%), the elaboration (40.3%), or the backgrounding region (48.0%). This is in contrast to the inference condition. The coherence break was recalled significantly better than any of these three regions. Contrasting the coherence break region against the average of these three regions in the inference condition, the difference is significant,  $t(43) = 6.712$ ,  $SE = .073$ .

The second region in which there was a reliable difference in percentage recalled between conditions was the conclusion. As noted, recall was low for this region, but it was higher in the inference condition than in the control, 30.0% versus 19.5%. This difference was reliable,  $F(1,38) = 13.497$ ,  $MSE=.020$ , and consistent with the finding in the coherence break region. The conclusion was comprised of one or two sentences which followed the coherence break. The third region in which



there was a reliable difference between conditions in the percentage which was recalled was the targeted cause, 88.5% versus 83.5%. This difference was reliable,  $F(1,34) = 5.988$ ,  $MSE=.008$ .

#### D. Discussion

There are several plausible explanations for the higher recall for the coherence break region in the inference condition. The first is that the targeted cause was not reinstated. Given this, the propositions in the coherence break region would not have been easily integrated with the rest of the passage and the information in the coherence break might have been considered somehow "weird". However, given the finding (Keenan et al., 1984; Myers et al., 1987; Duffy et al., 1990) that unresolvable coherence breaks led to a decrease in memory rather than an increase, this is an unlikely explanation. A more likely explanation of the recall results is that readers reinstated the targeted cause and integrated it with the coherence break. In this view, the additional processing needed to resolve the coherence break led to the creation of additional propositions and a more highly integrated, elaborated network. The additional retrieval paths improved the recall performance in the inference condition (Keenan et al., 1984; Myers et al., 1987; Duffy et al., 1990). The improvement in memory for the target information in the

inference condition is also expected because it has been reprocessed in that condition. Based on existing data (O'Brien & Myers, 1985; Albrecht & O'Brien, in press) and memory models (e.g. Kintsch & van Dijk, 1978; Raaijmaker & Shiffrin, 1981), propositions which are reactivated during the reinstatement process should be strengthened. This should facilitate recall.

The recall results support the resonance hypothesis. Despite the difference in recall for the targeted cause, there was essentially no difference in memory for the elaboration, with recall being slightly lower in the inference condition than in the control condition. The information needed to resolve the coherence break seems to have been directly accessed. There was better memory for the coherence break and for the targeted cause. No other material, either that surrounding the targeted cause, preceding it, or occurring between the causal information and the coherence break, was better remembered as a result of the reinstatement.

## CHAPTER X

### GENERAL DISCUSSION

Many models of text processing have emphasized the importance of causal relationships. Several theories (Fletcher & Bloom, 1988; Graesser, 1981; Suh & Trabasso, 1989; van den Broek, 1990) have assumed that readers reinstate backgrounded causes when no cause is available in working memory for the action or event in the focal sentence. Much of the support for this claim has been open to alternative interpretations or has been based on studies which used texts that were highly constrained. The goal of the present set of experiments was to address fundamental questions about the impact of causal coherence breaks: Do readers reinstate backgrounded information in order to understand currently processed actions or events, as the reinstatement hypothesis claims, or do they wait until additional information is provided, as the wait-and-see hypothesis claims? If backgrounded information is reactivated, what is the process by which this occurs? And how does the reinstatement process affect the memory representation?

The results of a word recognition task, a word naming task, a reading time measure, and a recall task, clearly support the reinstatement hypothesis. Experiment

1 provided evidence that the targeted cause was easier to integrate with the inference version of the texts than with the control and disconfirmed versions. Experiments 2 and 3 provided evidence that the targeted cause (BEAR) was active 500 ms after readers processed a sentence which contained a causal coherence break. The results of Experiment 4 suggested that readers did not only reactivate a single concept, but used this concept to form a new proposition (Bobby had seen a bear) which acted as a cause for the action in the focal sentence. This causal link was maintained in working memory and influenced the processing of the next sentence. The recall results of Experiment 5 provided evidence that the causal link was also included in the LTM text representation.

Whereas the results of these experiments provided support for the reinstatement hypothesis, which is fundamental to several prominent theories of discourse processing (Fletcher & Bloom, 1988; Trabasso & Sperry, 1985; Trabasso & van den Broek, 1985; van den Broek, 1990), the results were more consistent with the resonance hypothesis than the search hypothesis implicit in these theories. According to the resonance hypothesis, the reinstatement process is initiated by the overlap of traces in the focal sentence and in the discourse representation rather than by a break in

coherence. This overlap of traces causes the inactive elements to become reactivated, or to "resonate". In contrast to the search hypothesis, the backgrounded information is accessed and directly rather than through a systematic search of memory. Although these experiments did not provide a critical test of the underlying mechanisms, the results, in combination with the findings in several recent papers (Albrecht & O'Brien, in press; Huitema et al., in press; Klin & Myers, 1993; Myers et al., accepted pending revision), provide several sources of support for the resonance hypothesis.

One source of support for the resonance hypothesis was provided by the recall task. There was better memory for the causal coherence break and for the targeted cause, suggesting that the causal link had been formed and included in the text representation. Despite this, memory was not improved for any other portion of the text in the inference condition. Based on the results of O'Brien & Myers (1985), and on several memory models (e.g. Kintsch & van Dijk, 1978; Raaijmaker & Shiffrin, 1981) there should have been better recall for any portion of the text that was reprocessed in the attempt to locate a cause. This suggests that readers were able to directly access the targeted cause without reviewing other portions of the text.



A second source of support for the resonance hypothesis was the reading time results in Experiments 1, 2 and 3. It should be noted that these conclusions are based on null results, the lack of a difference in reading times between conditions. Nevertheless, because the results are consistent with several other sources of support for the resonance hypothesis, they are worth considering. If readers had searched for a cause after processing a causal coherence break, there should have been an observable slow-down in reading on the last line of the passage in the inference condition. But this was not found, either in Klin & Myers (1993), or in these experiments, despite the revisions made in the passages to equate the last lines.

The reading times for the disconfirmed condition are also relevant. According to the search hypothesis, the unresolvable coherence break in the disconfirmed condition should have initiated a search. But there was no slow-down in reading in the disconfirmed condition compared to the control condition, where a cause for the action in the last line was easily located. This is consistent with the resonance hypothesis. According to this view, it is the overlap of traces rather than the presence of the coherence break which initiates the reinstatement process.

Additional support for the resonance hypothesis can be found in studies in which backgrounded information was reactivated even when the text was locally coherent. For example, in one passage (Albrecht & O'Brien, in press; Myers et al., accepted pending revision) the protagonist, Bill, was described as being old and having difficulty getting around. This description of Bill was backgrounded by a complete shift in focus as well as the introduction of a new character. In a target sentence which followed, Bill was described as running into the street to save a child from an oncoming car. Although the target sentence could be integrated both causally and referentially with the immediately preceding text, there was a dramatic slow-down in reading, demonstrating that readers were aware of the contradiction. Features shared by the information in the focal sentence (Bill running) presumably reactivated related traces in the discourse representation (Bill being unable to run). According to the resonance hypothesis, it was the overlap of traces that led to the reactivation of the backgrounded information. Without the mismatch however, the reinstated information may not have been integrated with the target sentence. For example, in the condition in which the description of the character was consistent with the target action (Bill was young and healthy), the

backgrounded information may have only been reactivated briefly.

Although there are many details which are still unspecified in the resonance hypothesis, it does challenge the assumption that apparently complex tasks such as the processing of stories must involve complex rules. The resonance hypothesis is a bottom-up approach that does not depend on such rules. It begins with the assumption that the process of building a coherent representation of a story has much in common with other lower level processes, such as automatic searches of memory. This is in contrast to several theories of discourse processing which have characterized much of inferential processing as a problem-solving task.

In order to further develop the resonance theory, two groups of questions require further study, each corresponding to one stage of the process. The first group of questions address the reactivation process. What exactly are these traces, or features? And what variables influence their effectiveness as recall cues? The second group of questions address the integration process. Under what circumstances are these reactivated traces integrated with the focal material?

Starting with the latter question, the contradiction studies provided evidence that the mismatch of features can be the impetus for the integration of reactivated

propositions. The current set of experiments provided evidence that the lack of causal coherence is another condition under which reactivated traces are integrated. There is a great deal of evidence demonstrating that reactivated traces may also be integrated when there is a need to establish referential coherence. Antecedents to pronouns and noun phrases can be integrated with the focal sentence when they fit in number, gender, and so on. Inappropriate antecedents which share some features with the anaphor have been shown to be reactivated and then suppressed (Gernsbacher, 1989).

But what about situations in which there is no contradiction, and the focal sentence is completely coherent, both referentially and causally? Consider the following passage from Cybele, by Joyce Carol Oates:

...He pours himself another drink, staring into the paper cup. Around his neck are several thin gold chains; weighing rather heavily on his nose is a pair of plastic-framed sunglasses with very dark lenses...

Five pages later, in a new chapter, the following passage appears:

...Two black children, nine and ten years of age, are to discover the body, the thing, which will strike them at once as human, because of its size. Other children, called over to investigate, will argue that it is a dog. A very large dog. No, it's got some kind of necklaces on, those are gold necklaces, one of the children will protest. So's a dog sometimes, they got collars, don't they?

The sentence which refers to the necklaces in the second passage is both referentially and causally coherent



and it does not contradict any earlier information. Despite this, the connection is easily made between the gold necklaces on "the body, the thing" and the gold chains that Edwin, the protagonist, was earlier described as wearing. This example is particularly dramatic because these passages are five pages apart, and no reference has been made to Edwin in the chapter which contains the second passage.

This leads back to the first of the two groups of questions raised earlier: What are these traces and what variables influence how effective they are as recall cues? What was it about the above passage that might lead to the reactivation of the backgrounded information about the gold chains? It is not enough to say that there were overlapping traces. Intuition suggests that not all traces are equal. In the excerpt above, if Edwin had been described as being "a man of average height", this may not have been as effective a cue as the description of the gold necklace. On the other hand, if Edwin had been described as having lost an arm while serving in Vietnam and "the body" was also described as missing an arm, this may have been an even more effective cue than the gold chains.

This suggests that uniqueness, or informativeness, is one variable which influences the probability of reinstatement. Concepts that are particularly informative should be more effective in initiating the reactivation process than those that fit with our expectations, given the



context of the discourse. If Edwin had been described as being of average height, for example, this information may have been less strongly linked to the representation of Edwin because it does not add to or differ from our prototype of "a man." On the other hand, a dramatic break in coherence in which, for example, a protagonist acts in a way which is at odds with our expectations, might be focused on, elaborated, and integrated more fully. If the last line in the sample passage had been, "Timmy began screaming and running as fast as he could toward the camp," the features of danger and fear may have been stronger. This action is inconsistent with our schema, or expectation or what boy scouts do when they go looking for fire wood. The hypothesis that informativeness, or uniqueness, is one variable which influences the reinstatement process is consistent with studies which have found better memory for script departures (Bower, Black, & Turner, 1979).

In summary, the results of these five experiments demonstrated that there are conditions under which readers reinstate backgrounded causal information when they encounter a causal coherence break. The results were discussed in terms of the resonance hypothesis. This differs fundamentally from past accounts of text processing which have characterized the process of reinstating causal information as slow and complex. The attempt should be made, through future research, to determine how far a

simpler, bottom-up approach, such as the resonance model can go in accounting for the processes involved in discourse processing.

## A P P E N D I X A

### EXPERIMENTS 1 AND 2 - FULL SET OF MATERIALS. INFERENCE, CONTROL, AND DISCONFIRMED CONDITIONS.

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He talked about the plants and animals they might see. He warned them to be careful of bears. One had recently attacked some campers in the woods and they had been badly hurt. Then the ranger gave each boy a map and showed them the location of their campsites. Bobby and his friend Tim found theirs with no trouble. They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire. Minutes later, Tim saw Bobby coming back to the campsite. He was running hard, obviously very frightened.

BEAR

Did Bobby go camping with the Boy Scouts?

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He talked about the plants and animals they might see. He warned them to be careful of bears. One had recently attacked some campers in the woods and they had been badly hurt. Then the ranger gave each boy a map and showed them the location of their campsites. Bobby and his friend Tim found theirs with no trouble. They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire. Minutes later, Tim saw Bobby being chased by a big bee. He was running hard, obviously very frightened.

BEAR

Did Bobby go camping with the Boy Scouts?

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He talked about the plants and animals they might see. He told them that there had been dangerous bears in the woods. But as the climate changed, they had all died off. Then the ranger gave each boy a map and showed them the location of their campsites. Bobby and his friend Tim found theirs with no trouble.

They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire. Minutes later, Tim saw Bobby coming back to the campsite. He was running hard, obviously very frightened.

BEAR

Did Bobby go camping with the Boy Scouts?

Dick had been a single parent for six months, since he and his wife had separated. He was raising two sons, aged 11 and 13, while working full time and taking a night class once a week. Tonight the regular babysitter called at the last minute to cancel because she was sick so Dick decided to leave the boys alone. The last time they had been left alone, they had left the kitten unattended in the living room and it had broken several things. Dick told the boys to keep an eye on the kitten this evening. Dick managed to enjoy his class. It was a course in Organizational Behavior that he was taking as a requirement for his M.B.A. After class, he and several other students hung around and talked about getting together later in the week to study for the final exam. When he arrived home he walked through the living room and found a smashed lamp in pieces on the floor.

KITTEN

Was Dick happily married?

Dick had been a single parent for six months, since he and his wife had separated. He was raising two sons, aged 11 and 13, while working full time and taking a night class once a week. Tonight the regular babysitter called at the last minute to cancel because she was sick so Dick decided to leave the boys alone. The last time they had been left alone, they had left the kitten unattended in the living room and it had broken several things. Dick told the boys to keep an eye on the kitten this evening. Dick managed to enjoy his class. It was a course in Organizational Behavior that he was taking as a requirement for his M.B.A. After class, he and several other students hung around and talked about getting together later in the week to study for the final exam. When he arrived home he tripped over the coffee table and found a smashed lamp in pieces on the floor.

KITTEN



Was Dick happily married?

Dick had been a single parent for six months, since he and his wife had separated. He was raising two sons, aged 11 and 13, while working full time and taking a night class once a week. Tonight the regular babysitter called at the last minute to cancel because she was sick so Dick decided to leave the boys alone. The last time they had been left alone they had left the kitten unattended in the living room and it had broken several things. Dick gave a neighbor the kitten to keep for the evening. Dick managed to enjoy his class. It was a course in Organizational Behavior that he was taking as a requirement for his M.B.A. After class, he and several other students hung around and talked about getting together later in the week to study for the final exam. When he arrived home, he walked through the living room and found a smashed lamp in pieces on the floor.

KITTEN

Was Dick happily married?

Dave had flown from Boston to Philadelphia as he did every December for his company's annual meeting. The company he worked for flew in all its sales representatives once a year to discuss new products and to give a report on the year's successes and failures. Dave had worried throughout the trip because a routine medical check-up on his wife had raised the possibility of cancer. They were waiting for the results from her tests. Dave had a lot on his mind because he was up for a big promotion based on the presentation he was giving. When he arrived, he found that the hotel did not have a record of his reservation, and it took an hour before the matter was straightened out. He finally went to his room and reviewed the notes for his presentation one more time even though he knew he could probably give the talk in his sleep. When he spoke at the meeting that afternoon, his presentation was very well received. After the talk, he returned to the hotel and found a message for him at the front desk asking him to return home immediately.

CANCER

Did Dave take the train to Philadelphia?

Dave had flown from Boston to Philadelphia



as he did every December for his company's annual meeting. The company he worked for flew in all its sales representatives once a year to discuss new products and to give a report on the year's successes and failures. Dave had worried throughout the trip because a routine medical check-up on his wife had raised the possibility of cancer. They were waiting for the results from her tests. Dave had a lot on his mind because he was up for a big promotion based on the presentation he was giving. When he arrived, he found that the hotel did not have a record of his reservation, and it took an hour before the matter was straightened out. He finally went to his room and reviewed the notes for his presentation one more time even though he knew he could probably give the talk in his sleep. When he spoke at the meeting that afternoon, his presentation was very well received. After the talk, he returned to the hotel and found a water pipe had burst in his room. He decided to return home immediately.

CANCER

Did Dave take the train to Philadelphia?

Dave had flown from Boston to Philadelphia as he did every December for his company's annual meeting. The company he worked for flew in all its sales representatives once a year to discuss new products and to give a report on the year's successes and failures. Dave felt relieved throughout the trip because a routine medical check-up on his wife had raised the possibility of cancer, but the test results had come back negative. Dave had a lot on his mind because he was up for a big promotion based on the presentation he was giving. When he arrived, he found that the hotel did not have a record of his reservation, and it took an hour before the matter was straightened out. He finally went to his room and reviewed the notes for his presentation one more time even though he knew he could probably give the talk in his sleep. When he spoke at the meeting that afternoon, his presentation was very well received. After the talk, he returned to the hotel and found a message for him at the front desk asking him to return home immediately.

CANCER

Did Dave take the train to Philadelphia?

It was three days before Betty and her six year old

daughter Nancy were due to leave for their vacation on Cape Cod. They were really looking forward to it. Betty hoped that nothing would go wrong. She was concerned that Nancy had never had the measles. The little girl next door had just come down with them and Nancy played there most days after school. Betty knew how contagious the measles could be. Betty was concerned about getting everything packed, as well as doing all the last minute errands that needed to be done before they could leave town. She still had to ask her sister to come by and feed the cats while they were gone, and she needed to remember to swing by and pick up some of her sweaters from the dry cleaner's. Nights could be cool by the ocean even if the day had been hot. Betty was making a list of all the things they had left to do when Nancy ran in from playing outside with some of her friends. Betty was upset when Nancy complained of not feeling well.

#### MEASLES

Were Betty and Nancy going to the mountains on vacation?

It was three days before Betty and her six year old daughter Nancy were due to leave for their vacation on Cape Cod. They were really looking forward to it. Betty hoped that nothing would go wrong. She was concerned that Nancy had never had the measles. The little girl next door had just come down with them and Nancy played there most days after school. Betty knew how contagious the measles could be. Betty was concerned about getting everything packed, as well as doing all the last minute errands that needed to be done before they could leave town. She still had to ask her sister to come by and feed the cats while they were gone, and she needed to remember to swing by and pick up some of her sweaters from the dry cleaner's. Nights could be cool by the ocean even if the day had been hot. Betty was making a list of all the things they had left to do when Nancy ran in from playing outside and slipped and hit her head. Minutes later Nancy complained of not feeling well.

#### MEASLES

Were Betty and Nancy going to the mountains on vacation?

It was three days before Betty and her six year old daughter Nancy were due to leave for their vacation on Cape Cod. They were really looking forward to it. Betty hoped that nothing would go wrong. The little girl next door had just come down with

the measles and Nancy played there most days after school. Betty was pleased that Nancy had already had them so she could never have them again. Betty was concerned about getting everything packed, as well as doing all the last minute errands that needed to be done before they could leave town. She still had to ask her sister to come by and feed the cats while they were gone, and she needed to remember to swing by and pick up some of her sweaters from the dry cleaner's. Nights could be cool by the ocean even if the day had been hot. Betty was making a list of all the things they had left to do when Nancy ran in from playing outside with some of her friends. Betty was upset when Nancy complained of not feeling well.

#### MEASLES

Were Betty and Nancy going to the mountains on vacation?

Martha returned home after running out to pick up some groceries. She changed into her sweatpants, made herself a cup of tea and sat down to read the newspaper. She thought how much she hated President Johnson for sending the country's children to fight his war. It wasn't a cause that most of the country even believed in any more. Martha had spent months worrying about her 18 year old son who was in the 17th Airborne unit in Vietnam. Not knowing if he was alive was horrible. Luckily, Martha had an active social life, and her friends had always been a source of comfort. Tonight she was expecting several friends for the evening to play bridge. It was her turn to host the game and she had spent the afternoon cleaning up the house and preparing dessert. She decided to watch TV while she waited for her friends. She switched to the CBS 6:00 evening news and she suddenly broke down sobbing.

#### SON

Was it Martha's turn to host the bridge game?

Martha returned home after running out to pick up some groceries. She changed into her sweatpants, made herself a cup of tea and sat down to read the newspaper. She thought how much she hated President Johnson for sending the country's children to fight his war. It wasn't a cause that most of the country even believed in any more. Martha had spent months worrying about her 18 year old son who was in the 17th Airborne unit in Vietnam. Not knowing if he was alive was horrible. Luckily, Martha had an active social life, and her



friends had always been a source of comfort. Tonight she was expecting several friends for the evening to play bridge. It was her turn to host the game and she had spent the afternoon cleaning up the house and repairing dessert. She decided to watch TV while she waited for her friends. She heard that Martin Luther King was dead and she suddenly broke down sobbing.

SON

Was it Martha's turn to host the bridge game?

Martha returned home after running out to pick up some groceries. She changed into her sweatpants, made herself a cup of tea and sat down to read the newspaper. She thought how much she hated President Johnson for sending the country's children to fight his war. It wasn't a cause that most of the country even believed in any more.

Martha had spent months worrying about her 18 year old son who had been in the 17th Airborne unit in Vietnam. Finally, he had returned home.

Luckily, Martha had an active social life, and her friends had always been a source of comfort. Tonight she was expecting several friends for the evening to play bridge. It was her turn to host the game and she had spent the afternoon cleaning up the house and preparing desert. She decided to watch TV while she waited for her friends. She switched to the 6:00 CBS evening news and she suddenly broke down sobbing.

SON

Was it Martha's turn to host the bridge game?

Bill was overwhelmed by the stack of papers on his office desk. He was up against several deadlines before the end of the month.

His secretary stopped by to remind him that it was his wife's birthday. He had forgotten to buy her a present. He was very busy so he would have to take care of it later.

After the interruption, Bill managed to work his way through the pile of papers on the desk. He swore he'd never get this far behind again. He spent the afternoon interviewing applicants for a secretarial position.

His secretary had accepted a better job and had given her final two-week notice. Finally it was 5:00 so he decided to call it quits. On his way home, he stopped at a jeweler.

BIRTHDAY

Was Bill's secretary changing jobs?



Bill was overwhelmed by the stack of papers on his office desk. He was up against several deadlines before the end of the month. His secretary stopped by to remind him that it was his wife's birthday. He had forgotten to buy her a present. He was very busy so he would have to take care of it later. After the interruption, Bill managed to work his way through the pile of papers on the desk. He swore he'd never get this far behind again. He spent the afternoon interviewing applicants for a secretarial position. His secretary had accepted a better job and had given her final two-week notice. He decided he should buy her a going away present. On his way home, he stopped at a jeweler.

BIRTHDAY

Was Bill's secretary changing jobs?

Bill was overwhelmed by the stack of papers on his office desk. He was up against several deadlines before the end of the month. His secretary stopped by to remind him that it was his wife's birthday. He had forgotten to buy her a present so he ran out to Macy's and bought her a bottle of perfume and a silk scarf. After the interruption, Bill managed to work his way through the pile of papers on the desk. He swore he'd never get this far behind again. He spent the afternoon interviewing applicants for a secretarial position. His secretary had accepted a better job and had given her final two-week notice. Finally it was 5:00 so he decided to call it quits. On his way home, he stopped at a jeweler.

BIRTHDAY

Was Bill's secretary changing jobs?

The Chinese government had called out the troops to suppress the student protest but Chang Lee was determined to continue the battle for democracy. He met with several other students on the university campus. Some painted slogans on buildings, others tacked up statements against the government on bulletin boards, and Chang Lee put up posters protesting the government on several classroom walls. He returned home and thought about where to hide the posters. Finally, he put them under his back porch. Even though the remaining posters were the only evidence of his crime, he wanted to save them and use them later on.

When he finally entered his house, Chang found his mother waiting up. She often waited up for him even though he was almost 20 years old. They sat together and had a cup of tea before they both went to bed. When he got up the next morning, he entered the kitchen and was terrified to see soldiers searching the house.

POSTERS

Did Chang Lee live with his mother?

The Chinese government had called out the troops to suppress the student protest but Chang Lee was determined to continue the battle for democracy. He met with several other students on the university campus. Some painted slogans on buildings, others tacked up statements against the government on bulletin boards, and Chang Lee put up posters protesting the government on several classroom walls. He returned home and thought about where to hide the posters. Finally, he put them under his back porch. Even though the remaining posters were the only evidence of his crime, he wanted to save them and use them later on. When he finally entered his house, Chang found his mother waiting up. She often waited up for him even though he was almost 20 years old. They sat together and had a cup of tea before they both went to bed. When he got up he remembered about some stolen documents and was terrified to see soldiers searching the house.

POSTERS

Did Chang Lee live with his mother?

The Chinese government had called out the troops to suppress the student protest but Chang Lee was determined to continue the battle for democracy. He met with several other students on the university campus. Some painted slogans on buildings, others tacked up statements against the government on bulletin boards, and Chang Lee put up posters protesting the government on several classroom walls. On his way home he thought about what to do with the remaining posters. Because they were the only evidence of his crime he burned them in order to get rid of any evidence at his house. He'd make new ones tomorrow. When he finally entered his house, Chang found his mother waiting up. She often waited up for him even though he was almost 20 years old. They sat together and had a cup of tea before

they both went to bed. When he got up the next morning, he entered the kitchen and was terrified to see soldiers searching the house.

#### POSTERS

Did Chang Lee live with his mother?

Marge got home from her office and changed into her exercise clothes. She turned on the television and exercised to her favorite television aerobics class. When it was over, she started washing dishes in her tiny kitchen. The little apartment was all she and her husband Dan could afford. Marge thought about the promotion that Dan had been competing for at his office and prayed hard he would get it. They were expecting Dan's boss to announce who would get the promotion any day now. When Dan got home, Marge started to make supper. She got some lettuce and tomatoes out of the refrigerator to make a salad. After checking the clock, she began to work faster. They wanted to catch an early movie that evening. As they sat down to dinner, they were interrupted by a phone call. Dan got up and took the call in the living room. When Dan got off the phone he was smiling.

#### PROMOTION

Did Marge and Dan own their own house?

Marge got home from her office and changed into her exercise clothes. She turned on the television and exercised to her favorite television aerobics class. When it was over, she started washing dishes in her tiny kitchen. The little apartment was all she and her husband Dan could afford. Marge thought about the promotion that Dan had been competing for at his office and prayed hard he would get it. They were expecting Dan's boss to announce who would get the promotion any day now. When Dan got home, Marge started to make supper. She got some lettuce and tomatoes out of the refrigerator to make a salad. After checking the clock, she began to work faster. They wanted to catch an early movie that evening. As they sat down to dinner, they were interrupted by a phone call. Dan talked to his brother who told him a joke. When Dan got off the phone he was smiling.

#### PROMOTION

Did Marge and Dan own their own house?

Marge got home from her office and changed into her exercise clothes. She turned on the television



and exercised to her favorite television aerobics class. When it was over, she started washing dishes in her tiny kitchen. The little apartment was all she and her husband Dan could afford. Marge thought about the promotion that Dan had been competing for at his office and how excited they had been when he had got it. Dan's boss had just recently announced the promotion. When Dan got home, Marge started to make supper. She got some lettuce and tomatoes out of the refrigerator to make a salad. After checking the clock, she began to work faster. They wanted to catch an early movie that evening. As they sat down to dinner, they were interrupted by a phone call. Dan got up and took the call in the living room. When Dan got off the phone he was smiling.

PROMOTION

Did Marge and Dan own their own house?

Ed was happy to be home. This was his first leave from the army and he hadn't seen his family for quite some time. He had not visited home since his father had been slowed down by a mild heart attack. The doctor had urged him to relax more, warning him that his heart shouldn't be stressed. The weekend visit was a success. Ed's mother stuffed him with food, fond relatives and old friends came to visit, and Ed caught up on his sleep. All too soon, Ed's leave was over and he returned to the army camp. A week later, he got an important long distance phone call. When he got off the phone, he was in tears.

FATHER

Was Ed a physician?

Ed was happy to be home. This was his first leave from the army and he hadn't seen his family for quite some time. He had not visited home since his father had been slowed down by a mild heart attack. The doctor had urged him to relax more, warning him that his heart shouldn't be stressed. The weekend visit was a success. Ed's mother stuffed him with food, fond relatives and old friends came to visit, and Ed caught up on his sleep. All too soon, Ed's leave was over and he returned to the army camp. A week later, his girlfriend called to break up with him. When he got off the phone, he was in tears.

FATHER



Was Ed a physician?

Ed was happy to be home. This was his first leave from the army and he hadn't seen his family for quite some time. He had not visited home since his father had suddenly died of a heart attack. The doctor had urged him to relax more, but his father had continued his stressful pace. The weekend visit was a success. Ed's mother stuffed him with food, fond relatives and old friends came to visit, and Ed caught up on his sleep. All too soon, Ed's leave was over and he returned to the army camp. A week later, he got an important long distance phone call. When he got off the phone, he was in tears.

FATHER

Was Ed a physician?

Although Mike and Kelley lived in the same house, they felt like they never saw each other. Mike often worked evenings and Kelley spent most weekends rehearsing with her dance troupe. Mike and Kelley were determined to spend the next weekend together. They decided they would escape to Vermont and spend the entire weekend cross-country skiing and relaxing. The only problem was that there had not been any snow in the past several weeks. They were hoping it would snow soon; otherwise very few trails would be open. Kelley spent every evening that week putting in extra time with the dance troupe since she would miss the weekend rehearsals. They were planning a performance in three weeks and there was still a lot to do. The Friday night before they were to leave she rehearsed almost to midnight. Before going to bed, she fiddled with her radio and tuned into the station she wanted. After listening a while, she cheered.

SNOW

Was Kelley involved in acting?

Although Mike and Kelley lived in the same house, they felt like they never saw each other. Mike often worked evenings and Kelley spent most weekends rehearsing with her dance troupe. Mike and Kelley were determined to spend the next weekend together. They decided they would escape to Vermont and spend the entire weekend cross-country skiing and relaxing. The only problem was that there had not been any snow

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SNOW

Was Kelley involved in acting?

Although Mike and Kelley lived in the same house, they felt like they never saw each other. Mike often worked evenings and Kelley spent most weekends rehearsing with her dance troupe. Mike and Kelley were determined to spend the next weekend together. They decided they would escape to Vermont and spend the entire weekend cross-country skiing and relaxing.

The best part was that there two new feet of snow had fallen in the past several weeks. All trails were open and the forecast predicted more cold weather. Kelley spend every evening that week putting in extra time with the dance troupe since she would miss the weekend rehearsals. They were planning a performance in three weeks and there was still a lot to do. The Friday night before they were to leave she rehearsed almost to midnight. Before going to bed, she fiddled with her radio and tuned into the station she wanted. After listening a while, she cheered.

SNOW

Was Kelley involved in acting?

Sherry was graduating from high school in a few months and she had already been accepted by several colleges. Her first choice among these was Cornell but she couldn't afford to go there unless she won the New York state scholarship she was competing for. If the state didn't come through with the scholarship she would have to settle for a local school. She was incredibly busy at school. She was the editor of the yearbook and there was a deadline in one week. She was also the captain of the varsity softball team and this year the team had a chance of going all the way to the finals. She was extremely eager for

it, and they were practicing every day after school. Today when she arrived at home after practice, she found a letter sitting in the mailbox addressed to her. She excitedly ripped open the envelope.

SCHOLARSHIP

Was Sherry graduating from college?

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SCHOLARSHIP

Was Sherry graduating from college?

Sherry was graduating from high school in a few months and she had already been accepted by several colleges. Her first choice among these was Cornell and she couldn't have afforded to go there if she had not won the New York state scholarship she had applied for. If the state hadn't come through with the scholarship she would have had to settle for a local school.

She was incredibly busy at school. She was the editor of the yearbook and there was a deadline in one week. She was also the captain of the varsity softball team and this year the team had a chance of going all the way to the finals. She was extremely eager for it, and they were practicing every day after school. Today when she arrived at home after practice, she found a letter sitting in the mailbox addressed to her. She excitedly ripped open the envelope.

SCHOLARSHIP

Was Sherry graduating from college?

Arlene had woken up and become sick to her stomach. She was very frightened. Her life seemed to be such a terrible mess. She had become involved with her history professor. They had taken precautions, but she still wondered



if she might be pregnant.  
She shrugged off her worries and went to her first class, geology. She needed science credits and this looked like an easy B at least. Two of her best friends were in the class so she figured they could share notes and study together. But the class turned out to be harder than she had expected and she failed the first exam. Today she almost fell asleep during the lecture. As she left the class she did some hard thinking. She decided that she should really see her doctor.

PREGNANT

Did Arlene need science credits?

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She shrugged off her worries and went to her first class, geology. She needed science credits and this looked like an easy B at least. Two of her best friends were in the class so she figured they could share notes and study together. But the class turned out to be harder than she had expected and she failed the first exam. Today she almost fell asleep during the lecture. As she left the class she felt feverish and had a sore throat. She decided she should really see her doctor.

PREGNANT

Did Arlene need science credits?

Arlene had woken up and become sick to her stomach. She was very frightened. Her life seemed to be such a terrible mess. She had become involved with her history professor. She knew she couldn't have children so at least she didn't have to worry about being pregnant.  
She shrugged off her worries and went to her first class, geology. She needed science credits and this looked like an easy B at least. Two of her best friends were in the class so she figured they could share notes and study together. But the class turned out to be harder than she had expected and she failed the first exam. Today she almost fell asleep during the lecture. As she left the class she did some hard thinking. She decided that she should really see her doctor.



PREGNANT

Did Arlene need science credits?

Rick had spent the day playing with his friend Tony. They had played basketball in the backyard for almost two hours. Then Rick's mother went out to do some shopping, leaving them lunch in the kitchen.

Having renewed energy after lunch, they started wrestling in the living room. This ended quickly when they knocked a vase off the coffee table. They swept up the pieces of the vase, hoping that nobody would notice the mess.

Then they went upstairs to Rick's room to watch a football game on his TV set. It was an exciting game and the Patriots won the game in the last quarter. They were both big Patriots fans and they hoped that this year they would get to go to a game. Rick's father had promised to take them. After the game ended the boys heard Rick's mother come home from grocery shopping. She angrily called upstairs to Rick.

VASE

Did Rick watch television all day?

Rick had spent the day playing with his friend Tony. They had played basketball in the backyard for almost two hours. Then Rick's mother went out to do some shopping, leaving them lunch in the kitchen.

Having renewed energy after lunch, they started wrestling in the living room. This ended quickly when they knocked a vase off the coffee table. They swept up the pieces of the vase, hoping that nobody would notice the mess.

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VASE

Did Rick watch television all day?

Rick had spent the day playing with his friend Tony. They had played basketball in the backyard for almost two hours. Then Rick's mother

went out to do some shopping, leaving them lunch in the kitchen.

Having renewed energy after lunch, they started wrestling in the living room. This ended quickly when they almost knocked a vase off the coffee table. They decided to find a quieter activity so they wouldn't make a mess.

Then they went upstairs to Rick's room to watch a football game on his TV set. It was an exciting game and the Patriots won the game in the last quarter. They were both big Patriots fans and they hoped that this year they would get to go to a game. Rick's father had promised to take them. After the game ended the boys heard Rick's mother come home from grocery shopping. She angrily called upstairs to Rick.

VASE

Did Rick watch television all day?

Ron Jackson was surrounded by his supporters at his campaign kick-off dinner. He had been active in local politics for over 15 years and, after a great deal of deliberation, he had decided to run for the state senate. One of the reasons he had been hesitant was because of a small bribe he had accepted from a building contractor early in his political career. He hadn't even really considered it a bribe, but more like an exchange of favors. But he knew it would be disastrous if it got out to the public. He was concerned that if he were to win the election he would not have much free time to spend with his family. But his supporters had convinced him that he could do a lot of good for the state. The kick-off dinner had turned out wonderfully. A local jazz band had been hired and the crowd loved them. After dinner, Ron gave an inspirational speech and then opened the floor for questions. When a man in the back of the room stood up, Ron knew that he was in big trouble.

BRIBE

Was Ron running for State Senator?

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BRIBE

Was Ron running for State Senator?

Ron Jackson was surrounded by his supporters at his campaign kick-off dinner. He had been active in local politics for over 15 years and, after a great deal of deliberation, he had decided to run for the state senate. One of the reasons he had been encouraged to run was because of a stand he had taken with some building contractors early in his political career. He had been offered a bribe but had turned it down and exposed the contractors. He knew that this was his strong selling point with the public. He was concerned that if he were to win the election he would not have much free time to spend with his family. But his supporters had convinced him that he could do a lot of good for the state. The kick-off dinner had turned out wonderfully. A local jazz band had been hired and the crowd loved them. After dinner, Ron gave an inspirational speech and then opened the floor for questions. When a man in the back of the room stood up, Ron knew that he was in big trouble.

BRIBE

Was Ron running for State Senator?

Erica's parents showed her around the big new house they had just moved to. The backyard looked like a great place to play. Her dad told Erica that she could play in the garden or on the swings but not to go near the treehouse until he had destroyed a nest of hornets there.



Although the hornets were quiet right now, they could be dangerous if disturbed. They went for a walk around her new neighborhood so she wouldn't get lost when she went out to play. They were both pleased to find a playground a couple of blocks from the house. When they got back he left Erica to play while he went in the house to help his wife unpack. This was the part of moving he hated. He was amazed at the amount of stuff they owned. As he started unpacking a box of the good china, he looked out the window and saw Erica playing in the backyard. She started screaming and ran toward the house.

HORNETS

Was Erica's father unpacking the moving truck?

Erica's parents showed her around the big new house they had just moved to. The backyard looked like a great place to play. Her dad told Erica that she could play in the garden or on the swings but not to go near the treehouse until he had destroyed a nest of hornets there. Although the hornets were quiet right now, they could be dangerous if disturbed. They went for a walk around her new neighborhood so she wouldn't get lost when she went out to play. They were both pleased to find a playground a couple of blocks from the house. When they got back he left Erica to play while he went in the house to help his wife unpack. This was the part of moving he hated. He was amazed at the amount of stuff they owned. As he started unpacking a box of the good china, he looked out the window and saw Erica being chased by a big dog. She started screaming and ran toward the house.

HORNETS

Was Erica's father unpacking the moving truck?

Erica's parents showed her around the big new house they had just moved to. The backyard looked like a great place to play. Her dad told Erica that she could play in the garden or on the swings. She could also play in the treehouse. He had destroyed a nest of hornets there because, although they had been quiet, he knew they could have been dangerous if disturbed. They went for a walk around her new neighborhood so she wouldn't get lost when she went out to play. They were both pleased to find a playground a couple of blocks from the house. When they got back he left Erica to play while he went in the house to help his wife unpack. This was the part of moving



he hated. He was amazed at the amount of stuff they owned. As he started unpacking a box of the good china, he looked out the window and saw Erica playing in the backyard. She started screaming and ran toward the house.

HORNETS

Was Erica's father unpacking the moving truck?

The Bentons were spending the day in Rockport, wandering through the little shops and art galleries. They went into a crafts shop which specialized in handcrafted pieces of jewelry. Jane Benton loved these sorts of items but Jim got bored and wandered outside, telling her she could find him down the street when she was through looking. Jane fell in love with a pair of jade earrings. However, they were very expensive. Jim had their checkbook and credit card and so she reluctantly left the earrings. Jane browsed a while longer and then left the shop. She wondered where Jim had gone to. She checked out a men's clothing store, but no one remembered seeing anyone matching Jim's description. She began to wonder if he'd gotten lost but then saw him coming out of a book store. She quickly ran over to him, grabbed his arm, and dragged him back down the street.

EARRINGS

Did Jane find Jim in the clothing store?

The Bentons were spending the day in Rockport, wandering through the little shops and art galleries. They went into a crafts shop which specialized in handcrafted pieces of jewelry. Jane Benton loved these sorts of items but Jim got bored and wandered outside, telling her she could find him down the street when she was through looking. Jane fell in love with a pair of jade earrings. However, they were very expensive. Jim had their checkbook and credit card and so she reluctantly left the earrings. Jane browsed a while longer and then left the shop. She wondered where Jim had gone to. She checked out a men's clothing store, but no one remembered seeing anyone matching Jim's description. She began to wonder if he'd gotten lost but then saw him coming out of a book store. She wanted a cup of coffee at the cafe so she dragged him back down the street.

EARRINGS

Did Jane find Jim in the clothing store?

The Bentons were spending the day in Rockport, wandering through the little shops and art galleries. They went into a crafts shop which specialized in handcrafted pieces of jewelry. Jane Benton loved these sorts of items but Jim got bored and wandered outside, telling her she could find him down the street when she was through looking. Jane spotted an ugly pair of jade earrings. They were oddly shaped and very expensive. Jane was always amazed at the amount of money some people could spend on jewelery. Jane browsed a while longer and then left the shop. She wondered where Jim had gone to. She checked out a men's clothing store, but no one remembered seeing anyone matching Jim's description. She began to wonder if he'd gotten lost but then saw him coming out of a book store. She ran over to him, grabbed his arm, and dragged him back down the street.

#### EARRINGS

Did Jane find Jim in the clothing store?

The great detective, Sherlock Holmes, sat in his chair in his lodgings at 221 Baker street. His friend, Dr. Watson, sat across the room from him. Holmes was thinking about the case he was now on. He felt that he was close to identifying the killer of the Earl of Bath. The killer had to have known the Earl's habits and perhaps had been employed by him. As was his habit, Holmes picked up his violin and started to play. Once in a while, he puffed on a big pipe. Clouds of smoke filled the room. Suddenly he put down the violin, rose from his chair, and announced that they were going to visit the dead Earl's newly hired butler.

#### KILLER

Was Holmes smoking his pipe?

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#### KILLER

Was Holmes smoking his pipe?

The great detective, Sherlock Holmes, sat in his chair in his lodgings at 221 Baker street. His friend, Dr. Watson, sat across the room from him. Holmes was thinking about his most recent case. He had quickly identified and jailed the killer of the Earl of Bath. The answer became clear once he realized the killer knew the Earl's habits and was employed by him. As was his habit, Holmes picked up his violin and started to play. Once in a while, he puffed on a big pipe. Clouds of smoke filled the room. Suddenly he put down the violin, rose from his chair, and announced that they were going to visit the dead Earl's newly hired butler.

KILLER

Was Holmes smoking his pipe?

Rich's mother Paulette brought him to his friend David's house to play and then went inside to visit with David's mother. They sat and had a cup of coffee and talked about their jobs and their sons. Rich and David had been friends since first grade. They usually got along great but a few times over the past couple of years they had gotten into terrible fights. They had been pretty rough on each other. They had both been talked to about the fighting but it didn't seem to do a lot of good. Now they were working on building a tree house together and seemed to really enjoy the project. Paulette decided to head home and told Rich to be home by 6:00. She needed to go to grade some papers and make up a test for the freshman French class she was teaching. They were a good group of kids this year and she was having fun with the class. She finished all her work and then got started on supper. She looked out the window and saw Rich coming up the walk. Then she saw that his nose was bleeding.

FIGHT

Was Rich's mother a teacher?

Rich's mother Paulette brought him to his friend David's house to play and then went inside to visit with David's mother. They sat and had a cup of coffee and talked about their jobs and their sons. Rich and David had been friends since first grade. They usually got along great but a few times over the past couple of years they had gotten into terrible fights. They had been pretty rough on each other. They had both been talked to about the fighting but it didn't seem to do a lot of good. Now they were working on building a tree house together and seemed to really enjoy the project. Paulette decided to head home and told Rich to be home



by 6:00. She needed to go to grade some papers and make up a test for the freshman French class she was teaching. They were a good group of kids this year and she was having fun with the class. She finished all her work and then got started on supper. She looked out the window and saw Rich topple off his bike. Then she saw that his nose was bleeding.

FIGHT

Was Rich's mother a teacher?

Rich's mother Paulette brought him to his friend David's house to play and then went inside to visit with David's mother. They sat and had a cup of coffee and talked about their jobs and their sons. Rich and David had been friends since first grade. These past few years the boys always got along great. When they had been younger they had gotten into some terrible fights but they had both grown up a lot. They both read a lot and were involved with the soccer team and the youth orchestra. Now they were working on building a tree house together and seemed to really enjoy the project. Paulette decided to head home and told Rich to be home by 6:00. She needed to go to grade some papers and make up a test for the freshman French class she was teaching. They were a good group of kids this year and she was having fun with the class. She finished all her work and then got started on supper. She looked out the window and saw Rich coming up the walk. Then she saw that his nose was bleeding.

FIGHT

Was Rich's mother a teacher?



## A P P E N D I X B

### EXPERIMENT 3 - FULL SET OF MATERIALS. INFERENCE, CONTROL, AND DISCONFIRMED CONDITIONS.

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He talked about the plants and animals they might see. He warned them to be careful of bears. One had recently attacked some campers in the woods and they had been badly hurt. Several boy scout troops had canceled their plans because they were afraid of the danger that the bears presented. The ranger told the boys what to do if they should spot a bear. The ranger then gave each of the boys a map and showed them the location of their campsite. Bobby and his friend Tim found theirs with no trouble. They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire. Minutes later, Tim saw Bobby coming back to the campsite. He was running hard, obviously very frightened.

BEAR

Did Bobby go camping with the Boy Scouts?

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He talked about the plants and animals they might see. He warned them to be careful of bears. One had recently attacked some campers in the woods and they had been badly hurt.. Several boy scout troops had canceled their plans because they were afraid of the danger that the bears presented. The ranger told the boys what to do if they should spot a bear. The ranger then gave each of the boys a map and showed them the location of their campsite. Bobby and his friend Tim found theirs with no trouble. They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire. Minutes later, Tim saw Bobby being chased by a big bee. He was running hard, obviously very frightened.

BEAR

Did Bobby go camping with the Boy Scouts?

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He walked about the plants and animals they might see. He told them to be careful whenever they went exploring. There used to be bears in the woods but they had all been moved out of the park. A few years ago several campers had been badly hurt by a bear. That's when they finally trapped the bears and moved them far away where they weren't a threat. The ranger then gave each of the boys a map and showed them the location of their campsite. Bobby and his friend Tim found theirs with no trouble. They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire. Minutes later, Tim saw Bobby coming back to the campsite. He was running hard, obviously very frightened.

BEAR

Did Bobby go camping with the Boy Scouts?

Dick had been a single parent for six months, since he and his wife had separated. He was raising two sons, aged 11 and 13, while working full time and taking a night class once a week. Tonight the regular baby sitter called at the last minute to cancel because she was sick so Dick decided to leave the boys alone although it made him nervous to do so. The last time they had been left alone, it had been a disaster. He had sworn he'd never do it again, but he didn't seem to have any other choice. Last time they left the puppy unattended in the living room and it had broken several things. Dick was sorry he had let the boys have the puppy because they really weren't responsible enough to care for it. Dick told the boys to please keep an eye on the puppy this evening.

He managed to enjoy his class.

It was a course in Organizational Behavior that he was taking as a requirement for his M.B.A.

After class, he and several other students had a few beers and agreed to get together later in the week to study for the final exam. When he arrived home, he walked through the house and found that an expensive lamp had been smashed to pieces on the floor.

PUPPY

Was Dick happily married?

Dick had been a single parent for six months, since he and his wife had separated. He was raising two sons, aged 11 and 13, while working full time and taking a night class once a week. Tonight the regular baby sitter called at the last minute to cancel because she was sick so Dick decided to leave the boys alone although it made him nervous to do so. The last time they had been left alone, it had been a disaster. He had sworn he'd never do it again, but he didn't seem to have any other choice. Last time they left the puppy unattended in the living room and it had broken several things. Dick was sorry he had let the boys have the puppy because they really weren't responsible enough to care for it. Dick told the boys to please keep an eye on the puppy this evening. He managed to enjoy his class.

It was a course in Organizational Behavior that he was taking as a requirement for his M.B.A. After class, he and several other students had a few beers and agreed to get together later in the week to study for the final exam. When he arrived home, he walked through the house and stumbled against a lamp causing it to be smashed to pieces on the floor.

PUPPY

Was Dick happily married?

Dick had been a single parent for six months, since he and his wife had separated. He was raising two sons, aged 11 and 13, while working full time and taking a night class once a week. Tonight the regular baby sitter called at the last minute to cancel because she was sick so Dick decided to leave the boys alone although it made him nervous to do so. The last time they had been left alone, it had been a disaster. He had sworn he'd never do it again, but he didn't seem to have any other choice. Last time they left the puppy unattended in the living room and it had broken several things. Dick was sorry he had let the boys have the puppy because they really weren't responsible enough to care for it. This time Dick took the puppy to a neighbor's for the evening.

He managed to enjoy his class.

It was a course in Organizational Behavior that he was taking as a requirement for his M.B.A. After class, he and several other students had a few beers and agreed to get



together later in the week to study for the final exam. When he arrived home, he walked through the house and found that an expensive lamp had been smashed to pieces on the floor.

PUPPY

Was Dick happily married?

Dave had flown from Boston to Philadelphia as he did every December for his company's annual meeting. The company he worked for flew in all its sales representatives once a year to discuss new products and to give a report on the year's successes and failures. Dave had worried throughout the trip because a routine medical check-up on his wife had raised the possibility of cancer. They were waiting for the results from her tests and he was overwhelmed with anxiety. He felt like he wouldn't be able to bear it if she had cancer. It was time to get packed and ready to leave. He was up for a big promotion based on the presentation he was giving at the conference. When he arrived, he found that the hotel did not have a record of his reservation, and it took an hour before the matter was straightened out. He finally went to his room and reviewed the notes for his presentation one more time even though he knew he could probably give the talk in his sleep. When he spoke at the meeting that afternoon, his presentation was very well received. After the talk, he returned to the hotel and found a telephone message. After reading it, he decided to return home immediately.

WIFE

Did Dave take the train to Philadelphia?

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WIFE

Did Dave take the train to Philadelphia?

Dave had flown from Boston to Philadelphia as he did every December for his company's annual meeting. The company he worked for flew in all its sales representatives once a year to discuss new products and to give a report on the year's successes and failures. Dave felt relieved throughout the trip because a routine medical check-up on his wife had completely eliminated any possibility that she had cancer. The abnormality in her blood test was not due to cancer or anything serious at all. She had nothing but a low iron count. It was time to get packed and ready to leave. He was up for a big promotion based on the presentation he was giving at the conference. When he arrived, he found that the hotel did not have a record of his reservation, and it took an hour before the matter was straightened out. He finally went to his room and reviewed the notes for his presentation one more time even though he knew he could probably give the talk in his sleep. When he spoke at the meeting that afternoon, his presentation was very well received. After the talk, he returned to the hotel and found a telephone message. After reading it, he decided to return home immediately.

WIFE

Did Dave take the train to Philadelphia?

It was three days before Betty and her six year old daughter Nancy were due to leave for their vacation on Cape Cod. They were really looking forward to it. Betty hoped that nothing would go wrong. She was concerned that Nancy had never had the measles. The little girl next door had just come down with them and Nancy played there most days after school. Betty knew how contagious the measles could be and unfortunately Nancy had never had them.

About half of Nancy's class had come down with the measles over the past month and some children had been very sick. Betty set her mind to getting everything packed, as well as to doing all the last minute errands that needed to be done before they could leave town. She still had to ask her sister to come by and feed the cats while they were gone, and she needed to remember to swing by and pick up some of her sweaters from the dry cleaner's. Nights could be cool by the ocean even if the day had been hot. Betty was making a list of all the things they had left to do when Nancy ran in from playing outside with some of her friends. She sat down and complained of not feeling well.

#### MEASLES

Were Betty and Nancy going to the mountains on vacation?

It was three days before Betty and her six year old daughter Nancy were due to leave for their vacation on Cape Cod. They were really looking forward to it. Betty hoped that nothing would go wrong. She was concerned that Nancy had never had the measles. The little girl next door had just come down with them and Nancy played there most days after school. Betty knew how contagious the measles could be and unfortunately Nancy had never had them. About half of Nancy's class had come down with the measles over the past month and some children had been very sick. Betty set her mind to getting everything packed, as well as to doing all the last minute errands that needed to be done before they could leave town. She still had to ask her sister to come by and feed the cats while they were gone, and she needed to remember to swing by and pick up some of her sweaters from the dry cleaner's. Nights could be cool by the ocean even if the day had been hot. Betty was making a list of all the things they had left to do when Nancy ran in from playing outside and slipped and hit her head. She cried and complained of not feeling well.

#### MEASLES

Were Betty and Nancy going to the mountains on vacation?

It was three days before Betty and her six year old daughter Nancy were due to leave for their vacation on Cape Cod. They were really looking forward to it. Betty hoped that nothing would go wrong. She was pleased that Nancy had already had the measles.

The little girl next door had just come down with them and Nancy played there most days after school. Betty knew how contagious the measles could be to children who had never had them. But Nancy had been very sick with the measles when she was four. Betty was glad Nancy had them before she started school. Betty set her mind to getting everything packed, as well as to doing all the last minute errands that needed to be done before they could leave town. She still had to ask her sister to come by and feed the cats while they were gone, and she needed to remember to swing by and pick up some of her sweaters from the dry cleaner's. Nights could be cool by the ocean even if the day had been hot. Betty was making a list of all the things they had left to do when Nancy ran in from playing outside with some of her friends. She sat down and complained of not feeling well.

#### MEASLES

Were Betty and Nancy going to the mountains on vacation?

Martha returned home after running out to pick up some groceries. She changed into her sweatpants, made herself a cup of tea and sat down to read the newspaper. She thought how much she hated President Johnson for sending the country's children to fight his war. It wasn't a cause that most of the country even believed in any more. Martha had spent months worrying about her 18 year old son who was in the 17th Airborne unit in Vietnam. Not knowing if her son was alive was horrible. He was her only child and they were very close. This war was the hardest thing that had ever happened to her. Luckily, Martha had an active social life, and her friends had always been a source of comfort. Tonight she was expecting several friends for the evening to play bridge. It was her turn to host the game and she had spent the afternoon cleaning up the house and preparing dessert. While she waited for her friends, she whipped some cream for the pie. Then she watched the 6:00 news. Halfway through, she started to cry.

#### SON

Was it Martha's turn to host the bridge game?

Martha returned home after running out to pick up some groceries. She changed into her sweatpants, made herself a cup of tea and sat down to read the newspaper. She thought how much she hated



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SON

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SON

Was it Martha's turn to host the bridge game?

Bill was overwhelmed by the stack of papers on his office desk. He was up against several deadlines before the end of the month. His secretary stopped by to remind him that it was his wife's birthday. He had not yet bought her a present. He had forgotten



to get a birthday present last year too and his wife had really been hurt. He would have to get something but right now he was very busy so he would have to take care of it later. After the interruption, Bill managed to work his way through the pile of papers on the desk. He swore he'd never get this far behind again. By noon, he had almost caught up. After a quick lunch, he spent the afternoon interviewing applicants to replace his secretary. She was great but unfortunately she had accepted a better job and had given her final two-week notice. At 5:00 he decided to go home. Before leaving, he phoned a local jeweler.

BIRTHDAY

Was Bill's secretary changing jobs?

Bill was overwhelmed by the stack of papers on his office desk. He was up against several deadlines before the end of the month. His secretary stopped by to remind him that it was his wife's birthday. He had not yet bought her a present. He had forgotten to get a birthday present last year too and his wife had really been hurt. He would have to get something but right now he was very busy so he would have to take care of it later. After the interruption, Bill managed to work his way through the pile of papers on the desk. He swore he'd never get this far behind again. By noon, he had almost caught up. After a quick lunch, he spent the afternoon interviewing applicants to replace his secretary. She was great but unfortunately she had accepted a better job and had given her final two-week notice. He decided to get her a going-away gift so he phoned a local jeweler.

BIRTHDAY

Was Bill's secretary changing jobs?

Bill was overwhelmed by the stack of papers on his office desk. He was up against several deadlines before the end of the month. His secretary stopped by to remind him that it was his wife's birthday. He had forgotten to buy her a present. He had forgotten to get a birthday present last year too so he ran out to Macy's to buy her something special. He decided to splurge on a beautiful black wool coat. She

would be absolutely thrilled. After the interruption, Bill managed to work his way through the pile of papers on the desk. He swore he'd never get this far behind again. By noon, he had almost caught up. After a quick lunch, he spent the afternoon interviewing applicants to replace his secretary. She was great but unfortunately she had accepted a better job and had given her final two-week notice. At 5:00 he decided to go home. Before leaving, he phoned a local jeweler.

#### BIRTHDAY

Was Bill's secretary changing jobs?

The Chinese government had called out the troops to suppress the student protest but Chang Lee was determined to continue the battle for democracy. He worked with other students from the university making posters protesting the actions of the government. All night they posted them around the city. Shortly before dawn, the students dispersed after agreeing that Chang Lee would take the posters that had not yet been put up. He returned home and thought about where to hide the posters. Even though the remaining posters were the only evidence of his crime, he wanted to save them and use them later on. If he were caught with the posters he would be in big trouble, but he figured they would be safe if he hid them under the porch. When he finally entered his house, Chang Lee found his younger brother Hong waiting up. He often waited up for Chang Lee to discuss the day's events. Chang Lee often helped him with his homework, especially physics. He was an engineering major and had a lot of trouble with physics. It just didn't seem to make any sense to him. Chang Lee noticed that Hong looked upset and asked him if anything was wrong. Hong said that he had found out that the police were searching the neighborhood. Chang Lee leapt up in alarm.

#### POSTERS

Did Chang Lee live with his brother?

The Chinese government had called out the troops to suppress the student protest but Chang Lee was determined to continue the battle for democracy. He worked with other students from the university making posters protesting the

actions of the government. All night they posted them around the city. Shortly before dawn, the students dispersed after agreeing that Chang Lee would take the posters that had not yet been put up. He returned home and thought about where to hide the posters. Even though the remaining posters were the only evidence of his crime, he wanted to save them and use them later on. If he were caught with the posters he would be in big trouble, but he figured they would be safe if he hid them under the porch. When he finally entered his house, Chang Lee found his younger brother Hong waiting up. He often waited up for Chang Lee to discuss the day's events. Chang Lee often helped him with his homework, especially physics. He was an engineering major and had a lot of trouble with physics. It just didn't seem to make any sense to him. Chang Lee noticed that Hong looked upset and asked him if anything was wrong. Hong said that he had found out that he had been caught cheating on an exam. Chang leapt up in alarm.

#### POSTERS

Did Chang Lee live with his brother?

The Chinese government had called out the troops to suppress the student protest but Chang Lee was determined to continue the battle for democracy. He worked with other students from the university making posters protesting the actions of the government. All night they posted them around the city. Shortly before dawn, the students dispersed after agreeing that Chang Lee would take the posters that had not yet been put up. They had put a lot of work into making the posters but he decided it wasn't worth saving them. If he were caught with the posters he would be in big trouble because they had anti-government slogans on them. He decided to burn them in a vacant lot several miles away from his house. When he finally entered his house, Chang Lee found his younger brother Hong waiting up. He often waited up for Chang Lee to discuss the day's events. Chang Lee often helped him with his homework, especially physics. He was an engineering major and had a lot of trouble with physics. It just



didn't seem to make any sense to him.  
Chang Lee noticed that Hong looked upset  
and asked him if anything was wrong.  
Hong said that he had found out that  
the police were searching the neighborhood.  
Chang Lee leapt up in alarm.

#### POSTERS

Did Chang Lee live with his brother?

Marge got home from her office and changed into  
her jeans and a sweatshirt. She started  
washing dishes in her tiny kitchen.  
The little apartment was all she  
and her husband Dan could afford.  
Marge thought about the promotion that Dan  
had been competing for at his office and prayed  
hard he would get it. They were expecting Dan's  
boss to announce who would get the promotion any  
day now. It was driving them crazy waiting for  
the news. So many things in their lives would  
be easier if he could just be chosen for that promotion.  
When Dan got home, Marge started to make supper.  
She got some lettuce and tomatoes out of the  
refrigerator to make a salad. After checking  
the clock, she began to work faster. They  
wanted to catch an early movie that evening.  
As they sat down to dinner,  
they were interrupted by a phone call.  
Dan got up and took the call in the living room.  
When he got off the phone he looked delighted.

#### PROMOTION

Did Marge and Dan own their own house?

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her jeans and a sweatshirt. She started  
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Dan's sister had just had a healthy baby girl.  
When he got off the phone he looked delighted.  
PROMOTION

Did Marge and Dan own their own house?

Marge got home from her office and changed into her jeans and a sweatshirt. She started washing dishes in her tiny kitchen. The little apartment was all she and her husband Dan could afford. Marge thought about the promotion that Dan had been competing for at his office was thankful that he got it. Dan's boss had just announced that Dan had gotten the promotion last week. Now they could afford a larger apartment and maybe they would even start saving for a house of their own. Life would be a lot easier because of that promotion. When Dan got home, Marge started to make supper. She got some lettuce and tomatoes out of the refrigerator to make a salad. After checking the clock, she began to work faster. They wanted to catch an early movie that evening. As they sat down to dinner, they were interrupted by a phone call. Dan got up and took the call in the living room. When he got off the phone he looked delighted.

PROMOTION

Did Marge and Dan own their own house?

Ed was happy to be home. This was his first leave from the army and he hadn't seen his family for quite some time. He had not visited home since his father had been slowed down by a mild heart attack. The doctor had urged him to relax more, warning him that his heart shouldn't be stressed. Although the heart attack was mild, his father was at risk to have a second more serious heart attack if he didn't take care of himself. Ed's visit home was a success. His mother stuffed him with food, fond relatives and old friends came to visit, and Ed caught up on his sleep. All too soon, Ed's leave was over and he returned to the army camp. A week later, he got an important long distance phone call. When he got off the phone, he was in tears.

FATHER

Was Ed a physician?

Ed was happy to be home. This was his first leave from the army and he hadn't seen his family for quite some time.

He had not visited home since his father had been slowed down by a mild heart attack. The doctor had urged him to relax more, warning him that his heart shouldn't be stressed. Although the heart attack was mild, his father was at risk to have a second more serious heart attack if he didn't take care of himself. Ed's visit home was a success. His mother stuffed him with food, fond relatives and old friends came to visit, and Ed caught up on his sleep. All too soon, Ed's leave was over and he returned to the army camp. A week later, his girlfriend called to break up with him. When he got off the phone, he was in tears.

FATHER

Was Ed a physician?

Ed was happy to be home. This was his first leave from the army and he hadn't seen his family for quite some time. He had not visited home since his father had died from a severe heart attack. The doctor had urged him to relax more, warning him that his heart shouldn't be stressed. But his father hadn't listened and didn't believe he was really at risk of having a serious heart attack so he didn't take care of himself. Ed's visit home was a success. His mother stuffed him with food, fond relatives and old friends came to visit, and Ed caught up on his sleep. All too soon, Ed's leave was over and he returned to the army camp. A week later, he got an important long distance phone call. When he got off the phone, he was in tears.

FATHER

Was Ed a physician?

Although Mike and Kelley lived in the same house, they felt as if they never saw each other. Mike often worked evenings and Kelley spent most weekends rehearsing with her dance troupe. Mike and Kelley were determined to spend the next weekend together. They decided they would escape to Vermont and spend the entire weekend cross-country skiing and relaxing. The only problem was that there had not been any snow in the past several weeks. They were hoping it would snow soon; otherwise very few trails would be open. For the last two winters there hadn't been much snow and both of them really loved to ski. Mike had brand new cross country skis that he had never even used and he was dying to try them out.

Kelley spent every evening that week putting in extra time with the dance troupe since she would miss the weekend rehearsals. They were planning a performance in three weeks and there was still a lot to do. The Friday night before they were to leave she rehearsed almost to midnight. Before going to bed, she fiddled with her radio and tuned into the station she wanted. After listening a while, she cheered.

SNOW

Was Kelley involved in acting?

Although Mike and Kelley lived in the same house, they felt as if they never saw each other. Mike often worked evenings and Kelley spent most weekends rehearsing with her dance troupe. Mike and Kelley were determined to spend the next weekend together. They decided they would escape to Vermont and spend the entire weekend cross-country skiing and relaxing. The only problem was that there had not been any snow in the past several weeks. They were hoping it would snow soon; otherwise very few trails would be open. For the last two winters there hadn't been much snow and both of them really loved to ski. Mike had brand new cross country skis that he had never even used and he was dying to try them out. Kelley spent every evening that week putting in extra time with the dance troupe since she would miss the weekend rehearsals. They were planning a performance in three weeks and there was still a lot to do. The Friday night before they were to leave she rehearsed almost to midnight. Before going to bed, she fiddled with her radio and found a broadcast of the Celtics game. After listening a while, she cheered.

SNOW

Was Kelley involved in acting?

Although Mike and Kelley lived in the same house, they felt as if they never saw each other. Mike often worked evenings and Kelley spent most weekends rehearsing with her dance troupe. Mike and Kelley were determined to spend the next weekend together. They decided they would escape to Vermont and spend the entire weekend cross-country skiing and relaxing. The best part was that there had been two feet of new snow in the past several weeks. They were absolutely thrilled because all of the trails were open



with a very thick base of snow. For the last two winters here hadn't been much snow. Mike had brand new cross country skis that he couldn't wait to try them out this weekend. Kelley spent every evening that week putting in extra time with the dance troupe since she would miss the weekend rehearsals. They were planning a performance in three weeks and there was still a lot to do. The Friday night before they were to leave she rehearsed almost to midnight. Before going to bed, she fiddled with her radio and tuned into the station she wanted. After listening a while, she cheered.

SNOW

Was Kelley involved in acting?

Sherry was graduating from high school in a few months and she had already been accepted by several colleges. Her first choice among these was Cornell. It had a great agriculture school and her boyfriend was a freshman there. She couldn't afford to go there unless she won the New York state scholarship she was competing for. The scholarship would cover most of her expenses. If the state didn't come through with the scholarship she would have to settle for a local school. In the meantime, she was incredibly busy at school this year. She was the editor of the yearbook and there was a deadline in one week. She was also the captain of the varsity softball team and this year the team had a chance of going all the way to the finals. She was extremely eager for it, and they were practicing every day after school. Today when she arrived at home after practice, she found a letter sitting in the mailbox addressed to her. She excitedly ripped open the envelope.

SCHOLARSHIP

Was Sherry graduating from college?

Sherry was graduating from high school in a few months and she had already been accepted by several colleges. Her first choice among these was Cornell. It had a great agriculture school and her boyfriend was a freshman there. She couldn't afford to go there unless she won the New York state scholarship she was competing for. The scholarship would cover most of her expenses. If the state didn't come through with the scholarship she would have to settle for a local school. In the meantime, she was incredibly busy at school this year. She was the editor of the yearbook



and there was a deadline in one week. She was also the captain of the varsity softball team and this year the team had a chance of going all the way to the finals. She was extremely eager for it, and they were practicing every day after school. Today when she arrived at home after practice, she found a beautiful birthday card from her boyfriend. She excitedly ripped open the envelope.

#### SCHOLARSHIP

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Sherry was graduating from high school in a few months and she had already been accepted by several colleges. Her first choice among these was Cornell. It had a great agriculture school and her boyfriend was a freshman there. She couldn't have afforded to go if she hadn't won the New York state scholarship she had applied for. The scholarship would cover most of her expenses. If the state hadn't come through with the scholarship she would have settled for a local school. In the meantime, she was incredibly busy at school this year. She was the editor of the yearbook and there was a deadline in one week.

She was also the captain of the varsity softball team and this year the team had a chance of going all the way to the finals. She was extremely eager for it, and they were practicing every day after school. Today when she arrived at home after practice, she found a letter sitting in the mailbox addressed to her. She excitedly ripped open the envelope.

#### SCHOLARSHIP

Was Sherry graduating from college?

Arlene had woken up and become sick to her stomach. She was very frightened. Her life seemed to be such a terrible mess since she had become involved with her history professor. They had been careful, but she still wondered if she might be pregnant. It was a horrible thought. She felt as if her life would be over if she were pregnant. Her parents would kill her, she was sure. Her life was such a misery. She tried to put her worries aside as she walked across campus to her 9:00 class, geology. She needed science credits and this looked like an easy B at least. Two of her best friends were in the class so she figured they could share notes and study together. But the class turned out to be harder than she had expected and she failed the first exam. Today she almost fell asleep during the

lecture. As she left the class, she realized it was time to get her act together. She made an appointment at the health center.

PREGNANT

Did Arlene need science credits?

Arlene had woken up and become sick to her stomach. She was very frightened. Her life seemed to be such a terrible mess since she had become involved with her history professor. They had been careful, but she still wondered if she might be pregnant. It was a horrible thought. She felt as if her life would be over if she were pregnant. Her parents would kill her, she was sure. Her life was such a misery. She tried to put her worries aside as she walked across campus to her 9:00 class, geology. She needed science credits and this looked like an easy B at least. Two of her best friends were in the class so she figured they could share notes and study together. But the class turned out to be harder than she had expected and she failed the first exam. Today she almost fell asleep during the lecture. As she left the class, she realized she felt feverish and her throat hurt. She made an appointment at the health center.

PREGNANT

Did Arlene need science credits?

Arlene had woken up and become sick to her stomach. She was very frightened. Her life seemed to be such a terrible mess since she had become involved with her history professor. At least she didn't have to worry about being pregnant. Her parents almost killed her sister when she came home pregnant two years ago so Arlene had decided not to have sex with him. Still, her life was a misery. She tried to put her worries aside as she walked across campus to her 9:00 class, geology. She needed science credits and this looked like an easy B at least. Two of her best friends were in the class so she figured they could share notes and study together. But the class turned out to be harder than she had expected and she failed the first exam. Today she almost fell asleep during the lecture. As she left the class, she realized it was time to get her act together. She made an appointment at the health center.

PREGNANT

Did Arlene need science credits?

Rick had spent the day playing with his friend Tony. They had played basketball in the backyard for almost two hours. Then Rick's mother went out to do some shopping, reminding Rick to do take out the trash. The boys came in and had lunch and then started wrestling in the living room. This ended quickly when they knocked into the coffee table. An expensive vase that was on the table went flying through the air.

It crashed against the wall and broke into a million pieces. The boys cleaned up the mess but there seemed to be pieces everywhere. They hoped that nobody would notice the vase was missing.

When there were done, they went upstairs to Rick's room to watch a football game on his TV set. It was an exciting game and the Patriots won the game in the last quarter. They were both big Patriots fans and they hoped that this year they would get to go to a game. Rick's father had promised to take them. After the game ended, Rick's mother came home from grocery shopping. Rick heard her putting the groceries away. Then he heard her take out the vacuum cleaner and he started to panic.

VASE

Did Rick watch television all day?

Rick had spent the day playing with his friend Tony. They had played basketball in the backyard for almost two hours. Then Rick's mother went out to do some shopping, reminding Rick to do take out the trash. The boys came in and had lunch and then started wrestling in the living room. This ended quickly when they knocked into the coffee table. An expensive vase that was on the table went flying through the air.

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VASE

Did Rick watch television all day?

Rick had spent the day playing with his friend Tony. They had played basketball in the backyard for almost two hours. Then Rick's mother went out to do some shopping, reminding Rick to do his chores. The boys came in and had lunch and then started wrestling in the living room. This ended quickly when they almost knocked into the coffee table. There was an expensive vase on the table which would have gone flying through the air. It would have crashed into a million pieces. Rick decided they shouldn't be playing in the living room where there were vases, lamps and other fragile things. They needed a quieter activity and went upstairs to Rick's room to watch a football game on his TV set. It was an exciting game and the Patriots won the game in the last quarter. They were both big Patriots fans and they hoped that this year they would get to go to a game. Rick's father had promised to take them. After the game ended, Rick's mother came home from grocery shopping. Rick heard her putting the groceries away. Then he heard her take out the vacuum cleaner and he started to panic.

VASE

Did Rick watch television all day?

Ron Jackson was surrounded by his supporters at his campaign kick-off dinner. He had been active in local politics for over 15 years and, after a great deal of deliberation, he had decided to run for the state senate. One of the reasons he had been hesitant was because of a small bribe he had accepted from a building contractor early in his political career. He hadn't even really considered it



a bribe, but more like an exchange of favors. But he knew it would be disastrous if it got out to the public. It was a very small town and the people didn't forgive very easily. It made him angry that everything he had worked for all these years could be ruined because of one little mistake. Ron was also somewhat concerned that if he were to win the election he would not have much free time to spend with his family. But his supporters had convinced him that he could do a lot of good for the state. He had an impressive record. The campaign kick-off dinner had turned out wonderfully. A local jazz band had been hired and the crowd loved them. After dinner, Ron gave an inspirational speech and then opened the floor for questions. When a man in the back of the room stood up, Ron knew that he was in big trouble.

#### BRIBE

Was Ron running for State Senator?

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BRIBE

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BRIBE

Was Ron running for State Senator?

Erica's parents showed her around the big new house they had just moved to. The backyard looked like a great place to play. Her dad told Erica that she could play in the garden or on the swings but not to go near the tree house until he had destroyed a nest of hornets there. There were buzzing around outside of the nest and Erica was terrified. She was allergic to hornets and had once had a terrible reaction to a sting. Erica and her father went for a walk around her new neighborhood so she wouldn't get lost when she went out to play. They were both pleased to find a playground a couple of blocks from the house. When they got back he left Erica to play while he went in the house to help his wife unpack. This was the part of moving he hated. He was amazed at the amount of stuff they

owned. As he started unpacking a box of the good china, he looked out the window to check on Erica in the backyard. She was running to the house screaming.

HORNETS

Was Erica's father unpacking the moving truck?

Erica's parents showed her around the big new house they had just moved to. The backyard looked like a great place to play. Her dad told Erica that she could play in the garden or on the swings but not to go near the tree house until he had destroyed a nest of hornets there. There were buzzing around outside of the nest and Erica was terrified. She was allergic to hornets and had once had a terrible reaction to a sting. Erica and her father went for a walk around her new neighborhood so she wouldn't get lost when she went out to play. They were both pleased to find a playground a couple of blocks from the house. When they got back he left Erica to play while he went in the house to help his wife unpack. This was the part of moving he hated. He was amazed at the amount of stuff they owned. As he started unpacking a box of the good china, he looked out the window and saw a dog chasing Erica in the yard. She was running to the house screaming.

HORNETS

Was Erica's father unpacking the moving truck?

Erica's parents showed her around the big new house they had just moved to. The backyard looked like a great place to play. Her dad told Erica that she could play in the garden or on the swings. There was also a great tree house. Her father had destroyed a nest of hornets there. Although they had been quiet, he knew that they could be dangerous if disturbed. And last year Erica had a terrible reaction to a hornet sting. Erica and her father went for a walk around her new neighborhood so she wouldn't get lost when she went out to play. They were both pleased to find a playground a couple of blocks from the house. When they got back he left Erica to play while he went in the house to help his wife unpack. This was the part of moving he hated. He was amazed at the amount of stuff they owned. As he started unpacking a box of the good china, he looked out the window to check on Erica in the backyard. She was running to the house screaming.



## HORNETS

Was Erica's father unpacking the moving truck?

The Bentons were spending the day in Rockport, wandering through the little shops and art galleries. They went into a crafts shop which specialized in handcrafted pieces of jewelry. Jim got bored and wandered outside, telling her Jane could find him down the street when she was through looking.

Jane fell in love with a pair of jade earrings.

They were exactly what she had been looking for. Her daughter was getting married in a couple of months and she was looking for earrings to go with her dress. Unfortunately they were very expensive and she wasn't sure she could justify the expense. Jane browsed a while longer and then left the shop.

She wondered where Jim had gone to.

She checked out a men's clothing store that Jim really liked, but no one remembered seeing anyone matching his description. She began to wonder if he'd gotten lost but then saw him coming out of a book store.

She quickly ran over to him, grabbed his arm, and dragged him back down the street.

## EARRINGS

Did Jane find Jim in the clothing store?

The Bentons were spending the day in Rockport, wandering through the little shops and art galleries. They went into a crafts shop which specialized in handcrafted pieces of jewelry. Jim got bored and wandered outside, telling Jane she could find him down the street when she was through looking.

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She wanted a cup of coffee at the cafe so she dragged him back down the street.

## EARRINGS

Did Jane find Jim in the clothing store?



The Bentons were spending the day in Rockport, wandering through the little shops and art galleries. They went into a crafts shop which specialized in handcrafted pieces of jewelry. Jim got bored and wandered outside, telling Jane she could find him down the street when she was through looking.

Jane spotted an ugly pair of jade earrings. They were oddly shaped and very expensive. Jane was always amazed at the amount of money some people could spend on earrings. Jane looked a while longer at all of the other jewelry in the case. There really wasn't anything in the store that appealed to her at all. Jane browsed a while longer and then left the shop.

She wondered where Jim had gone to. She checked out a men's clothing store that Jim really liked, but no one remembered seeing anyone matching his description. She began to wonder if he'd gotten lost but then saw him coming out of a book store. She quickly ran over to him, grabbed his arm, and dragged him back down the street.

#### EARRINGS

Did Jane find Jim in the clothing store?

The great detective, Sherlock Holmes, sat in his chair in his lodgings at 221 Baker street. His friend, Dr. Watson, sat across the room from him. Holmes was thinking about the case he was now on. The Earl of Bath, a much loved man, had been killed. He felt that he was close to identifying the killer.

The answer was closer now that he had realized that the killer had to have known the Earl's habits and had to have interacted with him very closely. It was a very important case and he would get a large sum of money if he could find the killer.

As was his habit, Holmes picked up his violin and started to play. Once in a while, he puffed on a big pipe. Clouds of smoke filled the room. Suddenly he put down the violin, rose from his chair, and announced that they were going to visit the dead Earl's widow.

#### KILLER

Was Holmes smoking his pipe?

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KILLER

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KILLER

Was Holmes smoking his pipe?

Rich's mother Paulette brought him to his friend David's house to play and then went inside to visit with David's mother. They sat and had a cup of coffee and talked about their jobs and their sons. Rich and David had been friends since first grade. Although they were good friends, at various times over the past couple of years they had gotten into terrible fights. They had been pretty rough on each other. Once they hadn't been permitted to play together for several months because the fighting was so out of control. They had both been talked to about the fighting but it didn't always seem to do a lot of good. These days they were working on building a tree house together and seemed to really enjoy the project.

Paulette decided to head home and told Rich to be home by 6:00. She needed to go to grade some papers and make up a test for the freshman French class she was teaching. They were a good group of kids this year and she was having fun with the class. She finished all her work and then got started on supper. She looked out the window and saw Rich coming up the walk. As he approached, she saw that his nose was bleeding.

FIGHT

Was Rich's mother a teacher?

Rich's mother Paulette brought him to his friend David's house to play and then went inside to visit with David's mother. They sat and had a cup of coffee and talked about their jobs and their sons. Rich and David had been friends since first grade. Although they were good friends, at various times over the past couple of years they had gotten into terrible fights. They had been pretty rough on each other. Once they hadn't been permitted to play together for several months because the fighting was so out of control. They had both been talked to about the fighting but it didn't always seem to do a lot of good. These days they were working on building a tree house together and seemed to really enjoy the project.

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FIGHT

Was Rich's mother a teacher?

Rich's mother Paulette brought him to his friend David's house to play and then went inside to visit with David's mother. They sat and had a cup of coffee and talked about their jobs and their sons. Rich and David had been friends since first grade. These past few years the boys had always gotten along great. When they had been younger they had gotten into some terrible fights. Luckily they had both grown up a lot. It had been years since either of them had



fought with each other or had gotten into fights with any other kids. They both read a lot and were involved with the soccer team and the youth orchestra. These days they were working on building a tree house together and seemed to really enjoy the project.

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FIGHT

Was Rich's mother a teacher?



## A P P E N D I X C

### EXPERIMENT 4 - FULL SET OF MATERIALS. INFERENCE AND CONTROL CONDITIONS.

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He talked about the plants and animals they might see. He warned them to be careful of bears. One had recently attacked some campers in the woods and they had been badly hurt. Several boy scout troops had canceled their plans because they were afraid of the danger that the bears presented. The ranger told the boys what to do if they should spot a bear. The ranger then gave each of the boys a map and showed them the location of their campsite. Bobby and his friend Tim found theirs with no trouble. They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire. Minutes later, Tim saw Bobby coming back to the campsite. He was running hard, obviously very frightened. Several bees were chasing him. He looked really panicked. Did Bobby go camping with the Boy Scouts?

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He talked about the plants and animals they might see. He warned them to be careful of poison ivy. Some campers had recently been exposed to some when they set up their tents next a whole field of poison ivy plants. A few of the campers had even gone home early because they had such bad cases. The ranger told the boys how to spot poison ivy and how to avoid it. The ranger then gave each of the boys a map and showed them the location of their campsite. Bobby and his friend Tim found theirs with no trouble. They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire. Minutes later, Tim saw Bobby coming back to the campsite. He was running hard, obviously very frightened. Several bees were chasing him. He looked really panicked.

Did Bobby go camping with the Boy Scouts?

Dick had been a single parent for six months, since he and his wife had separated. He was raising two sons, aged 11 and 13, while working full time and taking a night class once a week. Tonight the regular baby sitter called at the last minute to cancel because she was sick so Dick decided to leave the boys alone although it made him nervous to do so. The last time they had been left alone, it had been a disaster. He had sworn he'd never do it again, but he didn't seem to have any other choice. Last time they left the puppy unattended in the living room and it had broken several things. Dick was sorry he had let the boys have the puppy because they really weren't responsible enough to care for it. Dick told the boys to please keep an eye on the puppy this evening. He managed to enjoy his class.

It was a course in Organizational Behavior that he was taking as a requirement for his M.B.A. After class, he and several other students had a few beers and agreed to get together later in the week to study for the final exam. When he arrived home, he walked through the house and found that an expensive lamp had been smashed to pieces on the floor. He must have knocked into it. He was always so clumsy. Was Dick happily married?

Dick had been a single parent for six months, since he and his wife had separated. He was raising two sons, aged 11 and 13, while working full time and taking a night class once a week. Tonight the regular baby sitter called at the last minute to say that she would be a few minutes late. Dave decided to take the car rather than the subway so that he could save a little time. He hated to arrive late because the class always started exactly on time. Dick really liked the professor but sometimes he as if he treated the students like children. The reality was that most of the students were over 30 and they worked full time and took classes in the evening. It was an exhausting way to live but most of them felt that it was the only way to get ahead in their careers. Dick managed to enjoy his class. It was a course in Organizational Behavior that

he was taking as a requirement for his M.B.A. After class, he and several other students had a few beers and agreed to get together later in the week to study for the final exam. When he arrived home, he walked through the house and found that an expensive lamp had been smashed to pieces on the floor. He must have knocked into it. He was always so clumsy. Was Dick happily married?

Dave had flown from Boston to Philadelphia as he did every December for his company's annual meeting. The company he worked for flew in all its sales representatives once a year to discuss new products and to give a report on the year's successes and failures. Dave had worried throughout the week because a routine medical check-up on his wife had raised the possibility of cancer. They were waiting for the results from her tests and he was overwhelmed with anxiety. He felt like he wouldn't be able to bear it if she had cancer. It was time to get packed and ready to leave. He was up for a big promotion based on the presentation he was giving at the conference. When he arrived, he found that the hotel did not have a record of his reservation, and it took an hour before the matter was straightened out. He finally went to his room and reviewed the notes for his presentation one more time even though he knew he could probably give the talk in his sleep. When he spoke at the meeting that afternoon, his presentation was very well received. After the talk, he returned to the hotel and found a telephone message. After reading it, he decided to return home immediately. The airline was going on strike. His ticket would be void after midnight. Did Dave take the train to Philadelphia?

Dave had flown from Boston to Philadelphia as he did every December for his company's annual meeting. The company he worked for flew in all its sales representatives once a year to discuss new products and to give a report on the year's successes and failures. Dave was bringing a lot of reading material with him for the plane ride because he was trying to decide what type of car to buy. He had the annual Consumer's Report and several other



publications. He had always owned American cars but it seemed that he might buy a Toyota Corolla this time. It was time to get packed and ready to leave. He was up for a big promotion based on the presentation he was giving at the conference. When he arrived, he found that the hotel did not have a record of his reservation, and it took an hour before the matter was straightened out. He finally went to his room and reviewed the notes for his presentation one more time even though he knew he could probably give the talk in his sleep. When he spoke at the meeting that afternoon, his presentation was very well received. After the talk, he returned to the hotel and found a telephone message. After reading it, he decided to return home immediately. The airline was going on strike. His ticket would be void after midnight. Did Dave take the train to Philadelphia?

It was three days before Betty and her six year old daughter Nancy were due to leave for their vacation on Cape Cod. They were really looking forward to it. Betty hoped that nothing would go wrong. She was concerned that Nancy had never had the measles. The little girl next door had just come down with them and Nancy played there most days after school. Betty knew how contagious the measles could be and unfortunately Nancy had never had them. About half of Nancy's class had come down with the measles over the past month and some children had been very sick. Betty set her mind to getting everything packed, as well as to doing all the last minute errands that needed to be done before they could leave town. She still had to ask her sister to come by and feed the cats while they were gone, and she needed to remember to swing by and pick up some of her sweaters from the dry cleaner's. Nights could be cool by the ocean even if the day had been hot. Betty was making a list of all the things they had left to do when Nancy ran in from playing outside with some of her friends. She sat down and complained of not feeling well. She had slipped and hit her head. Betty hoped it wasn't serious. Were Betty and Nancy going to the mountains on vacation?

It was three days before Betty and her six year old daughter Nancy were due to leave for their vacation on Cape Cod. They were really looking forward to it.



Betty hoped that nothing would go wrong. Nancy needed a lot of new clothes for the trip and she hadn't had enough time to get her everything she needed. She couldn't believe how fast Nancy outgrew her clothes. They had managed to get to the mall last weekend and had luckily found a bathing suit and some shorts. She figured they could pick up some sandals on the Cape. Betty set her mind to getting everything packed, as well as to doing all the last minute errands that needed to be done before they could leave town. She still had to ask her sister to come by and feed the cats while they were gone, and she needed to remember to swing by and pick up some of her sweaters from the dry cleaner's. Nights could be cool by the ocean even if the day had been hot. Betty was making a list of all the things they had left to do when Nancy ran in from playing outside with some of her friends. She sat down and complained of not feeling well. She had slipped and hit her head. Betty hoped it wasn't serious. Were Betty and Nancy going to the mountains on vacation?

Martha returned home after running out to pick up some groceries. She changed into her sweatpants, made herself a cup of tea and sat down to read the newspaper. She thought how much she hated President Johnson for sending the country's children to fight his war. It wasn't a cause that most of the country even believed in any more. Martha had spent months worrying about her 18 year old son who was in the 17th Airborne unit in Vietnam. Not knowing if her son was alive was horrible. He was her only child and they were very close. This war was the hardest thing that had ever happened to her. Luckily, Martha had an active social life, and her friends had always been a source of comfort. Tonight she was expecting several friends for the evening to play bridge. It was her turn to host the game and she had spent the afternoon cleaning up the house and preparing dessert. While she waited for her friends, she whipped some cream for the pie. Then she watched the 6:00 news. Halfway through, she started to cry. Martin Luther King was dead. She was in shock. Was it Martha's turn to host the bridge game?

Martha returned home after running out to pick up some groceries. She changed into her sweatpants, made herself a cup of tea and sat down to read the newspaper. She thought how much she liked President Johnson. It was a good time for the country. The economy had picked up and civil rights was finally become a prominent issue. She thought that President Johnson was more down to earth than most presidents. He had a couple of beagles and she figured that anybody who liked dogs couldn't be all bad. She always read the newspaper as a distraction from her troubles. She had just gone through a messy divorce. Luckily, she had an active social life, and her friends had always been a source of comfort. Tonight she was expecting several friends for the evening to play bridge. It was her turn to host the game and she had spent the afternoon cleaning up the house and preparing dessert. While she waited for her friends, she whipped some cream for the pie. Then she watched the 6:00 news. Halfway through, she started to cry.

Martin Luther King was dead.

She was in shock.

Was it Martha's turn to host the bridge game?

Bill was overwhelmed by the stack of papers on his office desk. He was up against several deadlines before the end of the month.

His secretary stopped by to remind him that it was his wife's birthday. He had not yet bought her a present. He had forgotten to get a birthday present last year too and his wife had really been hurt.

He would have to get something but right now he was very busy so he would have to take care of it later. After

the interruption, Bill managed to work his way through the pile of papers on the desk.

He swore he'd never get this far behind again.

By noon, he had almost caught up. After a quick lunch, he spent the afternoon interviewing applicants to replace his secretary. She was great but unfortunately she had accepted a better job and had given her final two-week notice.

At 5:00 he decided to go home. Before leaving, he phoned a local jeweler.

He wanted a gift for his secretary.

It was the least he could do.

Was Bill's secretary changing jobs?

Bill was overwhelmed by the stack of papers

on his office desk. He was up against several deadlines before the end of the month. His secretary stopped by to remind him to call his son's principal. She had called yesterday to set up an appointment with him and his wife to talk about some problems, but he hadn't had time to get back to her. He told his secretary to remind him again because he was very busy and he would have to take care of it tomorrow. After

through the pile of papers on the desk. He swore he'd never get this far behind again. By noon, he had almost caught up. After a quick lunch, he spent the afternoon interviewing applicants to replace his secretary. She was great but unfortunately she had accepted a better job and had given her final two-week notice. At 5:00 he decided to go home. Before leaving, he phoned a local jeweler. He wanted a gift for his secretary. It was the least he could do. Was Bill's secretary changing jobs?

The Chinese government had called out the troops to suppress the student protest but Chang Lee was determined to continue the battle for democracy. He worked with other students from the university making posters protesting the actions of the government. All night they posted them around the city. Shortly before dawn, the students dispersed after agreeing that Chang Lee would take the posters that had not yet been put up. He returned home and thought about where to hide the posters. Even though the remaining posters were the only evidence of his crime, he wanted to save them and use them later on. If he were caught with the posters he would be in big trouble, but he figured they would be safe if he hid them under the porch. When he finally entered his house, Chang Lee found his younger brother Hong waiting up. He often waited up for Chang Lee to discuss the day's events. Chang Lee often helped him with his homework, especially physics. He was an engineering major and had a lot of trouble with physics. It just didn't seem to make any sense to him. Chang Lee noticed that Hong looked upset and asked him if anything was wrong. Hong said that he had found out that



the police were searching the neighborhood.  
Chang Lee leapt up in alarm.  
He had some illegal drugs.  
He had to hide them quickly.  
Did Chang Lee live with his brother?

The Chinese government had called out the troops to suppress the student protest but Chang Lee was determined to continue the battle for democracy. He was spending all of time trying to organize the students on the campus. His hope was that he could organize a group of students to take turns speaking to different organizations about the need for democracy in the country. Almost two hundred students showed up for the evening's meeting. He was nervous about talking to so many students. But it was a cause he was passionate about so he forced himself to do it anyway. After the the first minute of his speech he relaxed a lot. In fact, he felt like he had given a really good speech. By the end of the meeting he was exhausted. When he finally entered his house, Chang Lee found his younger brother Hong waiting up. He often waited up for Chang Lee to discuss the day's events. Chang Lee often helped him with his homework, especially physics. He was an engineering major and had a lot of trouble with physics. It just didn't seem to make any sense to him. Chang Lee noticed that Hong looked upset and asked him if anything was wrong. Hong said he had found out that the police were searching the neighborhood. Chang leapt up in alarm.  
He had some illegal drugs.  
He had to hide them quickly.  
Did Chang Lee live with his brother?

Marge got home from her office and changed into her jeans and a sweatshirt. She started washing dishes in her tiny kitchen. The little apartment was all she and her husband Dan could afford. Marge thought about the promotion that Dan had been competing for at his office and prayed hard he would get it. They were expecting Dan's boss to announce who would get the promotion any day now. It was driving them crazy waiting for the news. So many things in their lives would be easier if he could just be chosen for that promotion.



When Dan got home, Marge started to make supper. She got some lettuce and tomatoes out of the refrigerator to make a salad. After checking the clock, she began to work faster. They wanted to catch an early movie that evening. As they sat down to dinner, they were interrupted by a phone call. Dan got up and took the call in the living room. When he got off the phone he looked delighted. His sister just had a baby. It was a little boy. Did Marge and Dan own their own house?

Marge got home from her office and changed into her jeans and a sweatshirt. She started washing dishes in her tiny kitchen. The little kitchen was all that the previous owners had wanted when they built the house. Marge figured that they didn't do much cooking. It drove her crazy, especially when she was preparing a large meal on the holidays. Eventually they were planning on putting an addition on the house and expanding the kitchen by about 6 feet. It would be fun to pick out all new appliances and design exactly what she wanted. When Dan got home, Marge started to make supper. She got some lettuce and tomatoes out of the refrigerator to make a salad. After checking the clock, she began to work faster. They wanted to catch an early movie that evening. As they sat down to dinner, they were interrupted by a phone call. Dan got up and took the call in the living room. When he got off the phone he looked delighted. His sister had just had a baby. It was a little boy. Did Marge and Dan own their own house?

Ed was happy to be home. This was his first leave from the army and he hadn't seen his family for quite some time. He had not visited home since his father had been slowed down by a mild heart attack. The doctor had urged him to relax more, warning him that his heart shouldn't be stressed. Although the heart attack was mild, his father was at risk to have a second more serious heart attack if he didn't take care of himself. Ed's visit home was a success. His mother stuffed him with food, fond relatives and old friends came to visit, and Ed caught up on his sleep. All too soon, Ed's leave was over

and he returned to the army camp. A week later, he got an important long distance phone call. When he got off the phone, he was in tears. His girlfriend had broken up with him. She had met somebody else. Was Ed a physician?

Ed was happy to be home. This was his first leave from the army and he hadn't seen his family for quite some time. He had not visited home since his father had retired. He had been a prominent surgeon and it was very difficult for him to decide to retire. He loved his work but he had other interests that he wanted to pursue. He loved camping and skiing and he also wanted to spend more time with his wife and children. Ed's visit home was a success. His mother stuffed him with food, fond relatives and old friends came to visit, and Ed caught up on his sleep. All too soon, Ed's leave was over and he returned to the army camp. A week later, he got an important long distance phone call. When he got off the phone, he was in tears. His girlfriend had broken up with him. She had met somebody else. Was Ed a physician?

Although Mike and Kelley lived in the same house, they felt as if they never saw each other. Mike often worked evenings and Kelley spent most weekends rehearsing with her dance troupe. Mike and Kelley were determined to spend the next weekend together. They decided they would escape to Vermont and spend the entire weekend cross-country skiing and relaxing. The only problem was that there had not been any snow in the past several weeks. They were hoping it would snow soon; otherwise very few trails would be open. For the last two winters there hadn't been much snow and both of them really loved to ski. Mike had brand new cross country skis that he had never even used and he was dying to try them out. Kelley spent every evening that week putting in extra time with the dance troupe since she would miss the weekend rehearsals. They were planning a performance in three weeks and there was still a lot to do. The Friday night before they were to leave she rehearsed almost to midnight. Before going to bed, she fiddled with her radio and tuned into the station she wanted.

After listening a while, she cheered.  
The Celtics had won again.  
She was a big fan.  
Was Kelley involved in acting?

Although Mike and Kelley lived in the same house, they felt as if they never saw each other. Mike often worked evenings and Kelley spent most weekends rehearsing with her dance troupe. Mike and Kelley were determined to spend the next weekend together. They decided they would escape to Vermont and spend the entire weekend cross-country skiing and relaxing. They were both good skiers and had been skiing since they were kids. Mike also played a lot of racquetball. He had played competitively when he was in college but now he usually just played for fun. He belonged to the YMCA in town and had a couple of partners who were about the same level as he was. Kelley spent every evening that week putting in extra time with the dance troupe since she would miss the weekend rehearsals. They were planning a performance in three weeks and there was still a lot to do. The Friday night before they were to leave she rehearsed almost to midnight. Before going to bed, she fiddled with her radio and tuned into the station she wanted. After listening a while, she cheered. The Celtics had won again. She was a big fan. Was Kelley involved in acting?

Sherry was graduating from high school in a few months and she had already been accepted by several colleges. Her first choice among these was Cornell. It had a great agriculture school and her boyfriend was a freshman there. She couldn't afford to go there unless she won the New York state scholarship she was competing for. The scholarship would cover most of her expenses. If the state didn't come through with the scholarship she would have to settle for a local school. In the meantime, she was incredibly busy at school this year. She was the editor of the yearbook and there was a deadline in one week. She was also the captain of the varsity softball team and this year the team had a chance of going all the way to the finals. She was extremely eager for it, and they were practicing every day after school. Today when she arrived at home after practice, she



found a letter sitting in the mailbox addressed to her. She excitedly ripped open the envelope. It was from her boyfriend. She missed him a lot. Was Sherry graduating from college?

Sherry was graduating from high school in a few months and she had already been accepted by several colleges. Her first choice among these was Cornell. It had a great agriculture school and her boyfriend was a freshman there. She knew that she had a reasonable chance of getting in. For one thing, her father graduated from Cornell, and they gave the edge to children of alums. In addition her grades were good and she had been involved in several sports. In the meantime, she was incredibly busy at school this year. She was the editor of the yearbook and there was a deadline in one week. She was also the captain of the varsity softball team and this year the team had a chance of going all the way to the finals. She was extremely eager for it, and they were practicing every day after school. Today when she arrived at home after practice, she found a letter sitting in the mailbox addressed to her. She excitedly ripped open the envelope. It was from her boyfriend. She missed him a lot. Was Sherry graduating from college?

Arlene had woken up and become sick to her stomach. She was very frightened. Her life seemed to be such a terrible mess since she had become involved with her history professor. They had been careful, but she still wondered if she might be pregnant. It was a horrible thought. She felt as if her life would be over if she were pregnant. Her parents would kill her, she was sure. Her life was such a misery. She tried to put her worries aside as she walked across campus to her 9:00 class, geology. She needed science credits and this looked like an easy B at least. Two of her best friends were in the class so she figured they could share notes and study together. But the class turned out to be harder than she had expected and she failed the first exam. Today she almost fell asleep during the lecture. As she left the class, she realized it was time to get her act together. She made an appointment at the health center. She felt feverish.



Maybe it was the flu.  
Did Arlene need science credits?

Arlene had woken up and become sick to her stomach. She was very frightened. Her life seemed to be such a terrible mess since she had started dating her history professor. They had been careful, but she still wondered if anybody knew. She was an honors student in the history department and she hoped to do graduate work in history. She knew that this would not look good if people found out. She tried to put her worries aside as she walked across campus to her 9:00 class, geology. She needed science credits and this looked like an easy B at least. Two of her best friends were in the class so she figured they could share notes and study together. But the class turned out to be harder than she had expected and she failed the first exam. Today she almost fell asleep during the lecture. As she left the class, she realized it was time to get her act together. She made an appointment at the health center. She felt feverish.  
Maybe it was the flu.  
Did Arlene need science credits?

Rick had spent the day playing with his friend Tony. They had played basketball in the backyard for almost two hours. Then Rick's mother went out to do some shopping, reminding Rick to do take out the trash. The boys came in and had lunch and then started wrestling in the living room. This ended quickly when they knocked into the coffee table. An expensive vase that was on the table went flying through the air. It crashed against the wall and broke into a million pieces. The boys cleaned up the mess but there seemed to be pieces everywhere. They hoped that nobody would notice the vase was missing. When there were done, they went upstairs to Rick's room to watch a football game on his TV set. It was an exciting game and the Patriots won the game in the last quarter. They were both big Patriots fans and they hoped that this year they would get to go to a game. Rick's father had promised to take them. After the game ended, Rick's mother

came home from grocery shopping. Rick heard her putting the groceries away. Then he heard her take out the vacuum cleaner and he started to panic. He had forgotten his chores. His mother would be furious. Did Rick watch television all day?

Rick had spent the day playing with his friend Tony. They had played basketball in the backyard for almost two hours. Then Rick's mother went out to do some shopping, reminding Rick to do take out the trash. The boys came in and had lunch and then hung out in the living room. They were bored and couldn't decide what to do with their day. They both liked to build things so they went out to the garage and looked over Rick's father's tools. When he turned 12 his father had given him permission to use most of them. They tried making a car out of some old scrap wood. Eventually they got sick of this and went upstairs to Rick's room to watch a football game on his TV set. It was an exciting game and the Patriots won the game in the last quarter. They were both big Patriots fans and they hoped that this year they would get to go to a game. Rick's father had promised to take them. After the game ended, Rick's mother came home from grocery shopping. Rick heard her putting the groceries away. Then he heard her take out the vacuum cleaner and he started to panic. He had forgotten his chores. His mother would be furious. Did Rick watch television all day?

Ron Jackson was surrounded by his supporters at his campaign kick-off dinner. He had been active in local politics for over 15 years and, after a great deal of deliberation, he had decided to run for the state senate. One of the reasons he had been hesitant was because of a small bribe he had accepted from a building contractor early in his political career. He hadn't even really considered it a bribe, but more like an exchange of favors. But he knew it would be disastrous if it got out to the public. It was a very small town

and the people didn't forgive very easily. It made him angry that everything he had worked for all these years could be ruined because of one little mistake. Ron was also somewhat concerned that if he were to win the election he would not have much free time to spend with his family. But his supporters had convinced him that he could do a lot of good for the state. He had an impressive record. The campaign kick-off dinner had turned out wonderfully. A local jazz band had been hired and the crowd loved them. After dinner, Ron gave an inspirational speech and then opened the floor for questions. When a man in the back of the room stood up, Ron knew that he was in big trouble. The man asked his views on abortion. He tried to think of a neutral answer. Was Ron running for State Senator?

Ron Jackson was surrounded by his supporters at his campaign kick-off dinner. He had been active in local politics for over 15 years and, after a great deal of deliberation, he had decided to run for the state senate. One of the reasons he had been hesitant was because of the amount of time it would take away from the rest of his life. He had built a successful law practice and he was reluctant to put it aside after all the effort he had put into it over the past few years. He was also concerned that this was a tough time to be entering state politics. There had been a terrible budget crisis for the past 4 years and most social and educational programs had been severely cut. Ron was also somewhat concerned that if he were to win the election he would not have much free time to spend with his family. But his supporters had convinced him that he could do a lot of good for the state. He had an impressive record. The campaign kick-off dinner had turned out wonderfully. A local jazz band had been hired and the crowd loved them. After dinner, Ron gave an inspirational speech and then opened the floor for questions. When a man in the back of the room stood up, Ron knew that he was in big trouble. The man asked his views on abortion. He tried to think of a neutral answer.



Was Ron running for State Senator?

Erica's parents showed her around the big new house they had just moved to. The backyard looked like a great place to play. Her dad told Erica that she could play in the garden or on the swings but not to go near the tree house until he had destroyed a nest of hornets there. There were buzzing around outside of the nest and Erica was terrified. She was allergic to hornets and had once had a terrible reaction to a sting. Erica and her father went for a walk around her new neighborhood so she wouldn't get lost when she went out to play. They were both pleased to find a playground a couple of blocks from the house. When they got back he left Erica to play while he went in the house to help his wife unpack. This was the part of moving he hated. He was amazed at the amount of stuff they owned. As he started unpacking a box of the good china, he looked out the window to check on Erica in the backyard. She was running to the house screaming. He saw a big dog chasing her. He ran to help her. Was Erica's father unpacking the moving truck?

Erica's parents showed her around the big new house they had just moved to. The backyard looked like a great place to play. Her dad told Erica that she could play in the garden or on the swings. Soon he would build her a tree house in the big oak tree in the yard. Erica had wanted a tree house ever since she played in her cousin's. Her father wanted to do something special for Erica because the move had been hard on her. Erica and her father went for a walk around her new neighborhood so she wouldn't get lost when she went out to play. They were both pleased to find a playground a couple of blocks from the house. When they got back he left Erica to play while he went in the house to help his wife unpack. This was the part of moving he hated. He was amazed at the amount of stuff they owned. As he started unpacking a box of the good china, he looked out the window to check on Erica in the backyard. She was running to the house screaming. He saw a big dog chasing her. He ran to help her. Was Erica's father unpacking the moving truck?



The Bentons were spending the day in Rockport, wandering through the little shops and art galleries. They went into a crafts shop which specialized in handcrafted pieces of jewelry. Jim got bored and wandered outside, telling her Jane could find him down the street when she was through looking. Jane fell in love with a pair of jade earrings. They were exactly what she had been looking for. Her daughter was getting married in a couple of months and she was looking for earrings to go with her dress. Unfortunately they were very expensive and she wasn't sure she could justify the expense. Jane browsed a while longer and then left the shop. She wondered where Jim had gone to. She checked out a men's clothing store that Jim really liked, but no one remembered seeing anyone matching his description. She began to wonder if he'd gotten lost but then saw him coming out of a book store. She quickly ran over to him, grabbed his arm, and dragged him back down the street. She wanted to go to the cafe. They had great cappucino there. Did Jane find Jim in the clothing store?

The Bentons were spending the day in Rockport, wandering through the little shops and art galleries. They went into a crafts shop which specialized in handcrafted pieces of jewelry. Jim got bored and wandered outside, telling her Jane could find him down the street when she was through looking. Jane fell in love with the town. It was so different than Boston where they lived. It made her think that she did not want to spend the rest of her life living in a big city. Here it was so quiet and peaceful and there were lots of places to ride a bike or to picnic. Jane looked at the crafts a while longer and then left the shops. She wondered where Jim had gone to. She checked out a men's clothing store that Jim really liked, but no one remembered seeing anyone matching his description. She began to wonder if he'd gotten lost but then saw him coming out of a book store. She quickly ran over to him, grabbed his arm, and dragged him back down the street. She wanted to go to the cafe. They had great cappucino there. Did Jane find Jim in the clothing store?

The great detective, Sherlock Holmes, sat in his chair in his lodgings at 221 Baker street. His friend, Dr. Watson, sat across the room from him. Holmes was thinking about the case he was now on. The Earl of Bath, a much loved man, had been killed. He felt that he was close to identifying the killer. The answer was closer now that he had realized that the killer had to have known the Earl's habits and had to have interacted with him very closely. It was a very important case and he would get a large sum of money if he could find the killer. As was his habit, Holmes picked up his violin and started to play. Once in a while, he puffed on a big pipe. Clouds of smoke filled the room. Suddenly he put down the violin, rose from his chair, and announced that they were going to visit the dead Earl's widow. He wanted to offer his condolences. They had been married for 30 years. Was Holmes smoking his pipe?

The great detective, Sherlock Holmes, sat in his chair in his lodgings at 221 Baker street. His friend, Dr. Watson, sat across the room from him. Holmes was thinking about all the cases he had solved. The latest was the case of the Earl of Bath. He was a much loved man and had been murdered on the first of October. Sherlock Holmes had identified the killer in just four days and he had been tried and jailed. It was a very important case and he received a large sum of money as well as notoriety for finding the killer. As was his habit, Holmes picked up his violin and started to play. Once in a while, he puffed on a big pipe. Clouds of smoke filled the room. Suddenly he put down the violin, rose from his chair, and announced that they were going to visit the dead Earl's widow. He wanted to offer his condolences. They had been married for 30 years. Was Holmes smoking his pipe?

Rich's mother Paulette brought him to his friend David's house to play and then went inside to visit with David's mother. They sat and had a cup of coffee and talked about their jobs and their sons. Rich and David had been friends since first grade. Although they were good friends, at various times over the past couple of years they had gotten into terrible fights.

They had been pretty rough on each other. Once they hadn't been permitted to play together for several months because the fighting was so out of control. They had both been talked to about the fighting but it didn't always seem to do a lot of good. These days they were working on building a tree house together and seemed to really enjoy the project.

Paulette decided to head home and told Rich to be home by 6:00. She needed to go to grade some papers and make up a test for the freshman French class she was teaching. They were a good group of kids this year and she was having fun with the class. She finished all her work and then got started on supper. She looked out the window and saw Rich coming up the walk. As he approached, she saw that his nose was bleeding. He had fallen off his bike. He lost control when he hit a rock. Was Rich's mother a teacher?

Rich's mother Paulette brought him to his friend David's house to play and then went inside to visit with David's mother. They sat and had a cup of coffee and talked about their jobs and their sons. Rich and David had been friends since first grade. Although they were good friends, at various times over the past couple of years they hadn't been as close. They had been in different classes in third grade so they had spent less time together that year. David had gotten involved with the band and seemed to be a very talented saxophone player. He took private lessons once a week and also practiced with the youth orchestra. These days they were working on building a tree house together and seemed to really enjoy the project.

Paulette decided to head home and told Rich to be home by 6:00. She needed to go to grade some papers and make up a test for the freshman French class she was teaching. They were a good group of kids this year and she was having fun with the class. She finished all her work and then got started on supper. She looked out the window and saw Rich coming up the walk. As he approached, she saw that his nose was bleeding. He had fallen off his bike. He lost control when he hit a rock. Was Rich's mother a teacher?



## A P P E N D I X D

### EXPERIMENT 5 - FULL SET OF MATERIALS AND RECALL CUES. INFERENCE AND CONTROL CONDITIONS.

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He talked about the plants and animals they might see. He warned them to be careful of bears. One had recently attacked some campers in the woods and they had been badly hurt. Several boy scout troops had canceled their plans because they were afraid of the danger that the bears presented. The ranger told the boys what to do if they should spot a bear. The ranger then gave each of the boys a map and showed them the location of their campsite. Bobby and his friend Tim found theirs with no trouble. They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire. Minutes later, Tim saw Bobby coming back to the campsite. He was running hard, obviously very frightened. Tim went out to meet him.  
Did Bobby go camping with the Boy Scouts?

It was Bobby's first camping trip. When his boy scout troop arrived at the campground, a forest ranger gave an orientation talk. He talked about the plants and animals they might see. He warned them to be careful of bears. One had recently attacked some campers in the woods and they had been badly hurt. Several boy scout troops had canceled their plans because they were afraid of the danger that the bears presented. The ranger told the boys what to do if they should spot a bear. The ranger then gave each of the boys a map and showed them the location of their campsite. Bobby and his friend Tim found theirs with no trouble. They put up their two-man tent and Tim started to open some cans of food while Bobby went off to look for kindling to start a fire. Minutes later, Tim saw Bobby being chased by a big bee. He was running hard, obviously very frightened. Tim went out to meet him.  
Did Bobby go camping with the Boy Scouts?  
RECALL CUE: Tim and Bobby went camping with the Boy Scouts.



Dick had been a single parent for six months, since he and his wife had separated. He was raising two sons, aged 11 and 13, while working full time and taking a night class once a week. Tonight the regular baby sitter called at the last minute to cancel because she was sick so Dick decided to leave the boys alone although it made him nervous to do so. The last time they had been left alone, it had been a disaster. He had sworn he'd never do it again, but he didn't seem to have any other choice. Last time they left the puppy unattended in the living room and it had broken several things. Dick was sorry he had let the boys have the puppy because they really weren't responsible enough to care for it. Dick told the boys to please keep an eye on the puppy this evening. He managed to enjoy his class. It was a course in Organizational Behavior that he was taking as a requirement for his M.B.A. After class, he and several other students had a few beers and agreed to get together later in the week to study for the final exam. When he arrived home, he walked through the house and found that an expensive lamp had been smashed to pieces on the floor. Dick went to get a broom to clean up the mess. Was Dick happily married?

Dick had been a single parent for six months, since he and his wife had separated. He was raising two sons, aged 11 and 13, while working full time and taking a night class once a week. Tonight the regular baby sitter called at the last minute to cancel because she was sick so Dick decided to leave the boys alone although it made him nervous to do so. The last time they had been left alone, it had been a disaster. He had sworn he'd never do it again, but he didn't seem to have any other choice. Last time they left the puppy unattended in the living room and it had broken several things. Dick was sorry he had let the boys have the puppy because they really weren't responsible enough to care for it. Dick told the boys to please keep an eye on the puppy this evening. He managed to enjoy his class. It was a course in Organizational Behavior that he was taking as a requirement for his M.B.A. After class, he and several other students had a few beers and agreed to get

together later in the week to study for the final exam. When he arrived home, he walked through the house and stumbled against a lamp causing it to be smashed to pieces on the floor. Dick went to get a broom to clean up the mess. Was Dick happily married?  
RECALL CUE: Dick was a single parent and taking a night course.

Dave had flown from Boston to Philadelphia as he did every December for his company's annual meeting. The company he worked for flew in all its sales representatives once a year to discuss new products and to give a report on the year's successes and failures. Dave had worried throughout the trip because a routine medical check-up on his wife had raised the possibility of cancer. They were waiting for the results from her tests and he was overwhelmed with anxiety. He felt like he wouldn't be able to bear it if she had cancer. It was time to get packed and ready to leave. He was up for a big promotion based on the presentation he was giving at the conference. When he arrived, he found that the hotel did not have a record of his reservation, and it took an hour before the matter was straightened out. He finally went to his room and reviewed the notes for his presentation one more time even though he knew he could probably give the talk in his sleep. When he spoke at the meeting that afternoon, his presentation was very well received. After the talk, he returned to the hotel and found a telephone message. After reading it, he decided to return home immediately. He started to pack his bags. Did Dave take the train to Philadelphia?

Dave had flown from Boston to Philadelphia as he did every December for his company's annual meeting. The company he worked for flew in all its sales representatives once a year to discuss new products and to give a report on the year's successes and failures. Dave had worried throughout the trip because a routine medical check-up on his wife had raised the possibility of cancer. They were waiting for the results from her tests and he was overwhelmed with anxiety. He felt like he wouldn't be able to bear it if she had cancer. It was time to get packed

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It was three days before Betty and her six year old daughter Nancy were due to leave for their vacation on Cape Cod. They were really looking forward to it. Betty hoped that nothing would go wrong. She was concerned that Nancy had never had the measles. The little girl next door had just come down with them and Nancy played there most days after school. Betty knew how contagious the measles could be and unfortunately Nancy had never had them. About half of Nancy's class had come down with the measles over the past month and some children had been very sick. Betty set her mind to getting everything packed, as well as to doing all the last minute errands that needed to be done before they could leave town. She still had to ask her sister to come by and feed the cats while they were gone, and she needed to remember to swing by and pick up some of her sweaters from the dry cleaner's. Nights could be cool by the ocean even if the day had been hot. Betty was making a list of all the things they had left to do when Nancy ran in from playing outside with some of her friends. She sat down and complained of not feeling well. Betty brought her a glass of juice. Were Betty and Nancy going to the mountains on vacation?

It was three days before Betty and her six year old daughter Nancy were due to leave for their vacation on Cape Cod. They were really looking forward to it. Betty hoped that nothing would go wrong. She was concerned that Nancy had never had the measles. The little girl next door had just come down with



them and Nancy played there most days after school. Betty knew how contagious the measles could be and unfortunately Nancy had never had them. About half of Nancy's class had come down with the measles over the past month and some children had been very sick. Betty set her mind to getting everything packed, as well as to doing all the last minute errands that needed to be done before they could leave town. She still had to ask her sister to come by and feed the cats while they were gone, and she needed to remember to swing by and pick up some of her sweaters from the dry cleaner's. Nights could be cool by the ocean even if the day had been hot. Betty was making a list of all the things they had left to do when Nancy ran in from playing outside and slipped and hit her head. She cried and complained of not feeling well. Betty brought her a glass of juice. Were Betty and Nancy going to the mountains on vacation? RECALL CUE: Nancy and Betty were getting ready to go on vacation.

Martha returned home after running out to pick up some groceries. It was her turn to host the bridge game. They played every Friday night. Martha made herself a cup of tea and sat down to read the newspaper. She thought how much she hated President Johnson for sending the country's children to fight his war. It wasn't a cause that most of the country even believed in any more. Martha had spent months worrying about her 18 year old son who was in the 17th Airborne unit in Vietnam. Not knowing if her son was alive was horrible. He was her only child and they were very close. This war was the hardest thing that had ever happened to her. Luckily, Martha had an active social life, and her friends had always been a source of comfort. Tonight she was expecting three of her friends for the evening to play bridge. Since it was her turn to host the game she had spent the afternoon cleaning up the house and preparing dessert. While she waited for her friends, she whipped some cream for the pie. Then she watched the 6:00 news. Halfway through, she started to cry. Tears were running down her face. Was it Martha's turn to host the bridge game?

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game. They played every Friday night. Martha made herself a cup of tea and sat down to read the newspaper. She thought how much she hated President Johnson for sending the country's children to fight his war. It wasn't a cause that most of the country even believed in any more. Martha had spent months worrying about her 18 year old son who was in the 17th Airborne unit in Vietnam. Not knowing if her son was alive was horrible. He was her only child and they were very close. This war was the hardest thing that had ever happened to her. Luckily, Martha had an active social life, and her friends had always been a source of comfort. Tonight she was expecting three friends for the evening to play bridge. Since it was her turn to host the game she had spent the afternoon cleaning up the house and preparing dessert. While she waited for her friends, she whipped some cream for the pie. Then she read a very sappy love story. As always, she started to cry. Tears were running down her face. Was it Martha's turn to host the bridge game? RECALL CUE: It was Martha's turn to host the bridge game. They played every Friday night.

Marge got home from her office and changed into her jeans and a sweatshirt. She and her husband Dan were going to see the movie Superman that night. She started washing dishes in her tiny kitchen. The little apartment was all she and her husband Dan could afford. Marge thought about the promotion that Dan had been competing for at his office and prayed hard he would get it. They were expecting Dan's boss to announce who would get the promotion any day now. It was driving them crazy waiting for the news. So many things in their lives would be easier if he could just be chosen for that promotion. When Dan got home, Marge started to make supper. She got some lettuce and tomatoes out of the refrigerator to make a salad. After checking the clock, she began to work faster. They wanted to catch the early movie that evening. As they sat down to dinner, they were interrupted by a phone call. Dan got up and took the call in the living room. When he got off the phone he was delighted. He returned to the kitchen to finish his dinner. Did Marge and Dan own their own house?

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her jeans and a sweatshirt. She and her husband Dan were going to see the movie Superman that night. She started washing dishes in her tiny kitchen. The little apartment was all she and her husband Dan could afford. Marge thought about the promotion that Dan had been competing for at his office and prayed hard he would get it. They were expecting Dan's boss to announce who would get the promotion any day now. It was driving them crazy waiting for the news. So many things in their lives would be easier if he could just be chosen for that promotion. When Dan got home, Marge started to make supper. She got some lettuce and tomatoes out of the refrigerator to make a salad. After checking the clock, she began to work faster. They wanted to catch an early movie that evening. As they sat down to dinner, they were interrupted by a phone call. Dan's sister had just had a healthy baby girl. When he got off the phone he was delighted. He returned to the kitchen to finish his dinner. Did Marge and Dan own their own house?  
RECALL CUE: Marge got home from work and she and her husband Dan were going to see the movie Superman.

Ed was happy to be home. This was his first leave from the army and he hadn't seen his family for quite some time. He had not visited home since his father had been slowed down by a mild heart attack. The doctor had urged him to relax more, warning him that his heart shouldn't be stressed. Although the heart attack was mild, his father was at risk to have a second, more serious heart attack if he didn't take care of himself. Ed's visit home was a success. His mother stuffed him with food, fond relatives and old friends came to visit, and Ed caught up on his sleep. All too soon, Ed's leave was over and he returned to the army camp. A week later, he got an important long distance phone call. When he got off the phone, he was in tears. He threw himself down on his bed in misery. Was Ed a physician?

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RECALL CUE: Ed was visiting his family while he was on leave from the army.

Although Mike and Kelley lived in the same house, they felt as if they never saw each other. Mike often worked evenings and Kelley spent most weekends rehearsing with her dance troupe. Mike and Kelley were determined to spend the next weekend together. They decided they would escape to Vermont and spend the entire weekend cross-country skiing and relaxing. The only problem was that there had not been any snow in the past several weeks. They were hoping it would snow soon; otherwise very few trails would be open. For the last two winters there hadn't been much snow and both of them really loved to ski. Mike had brand new cross country skis that he had never even used and he was dying to try them out. Kelley spent every evening that week putting in extra time with the dance troupe since she would miss the weekend rehearsals. They were planning a performance in three weeks and there was still a lot to do. The Friday night before they were to leave she rehearsed almost to midnight. Before going to bed, she fiddled with her radio and tuned into the station she wanted. After listening a while, she cheered. Then she turned off the radio and went to sleep. Was Kelley involved in acting?

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RECALL CUE: Mike and Kelley lived in the same house but felt like they never saw each other because they were so busy.

Sherry was graduating from high school in a few months. She attended the High School of the Performing Arts in New York City. She was a good dancer and also took some drama. She had already been accepted by several colleges. Her first choice among these was Cornell. It had a great reputation and her boyfriend was a freshman there. She couldn't afford to go there unless she won the New York state scholarship she was competing for. The scholarship would cover most of her expenses. If the state didn't come through with the scholarship she would have to settle for a local school. In the meantime, she was incredibly busy at school this year. She was the editor of the yearbook and there was a deadline in one week. She was also the captain of the local softball team and this year the team had a chance of going all the way to the finals. She was extremely eager for it, and they were practicing every day after school. Today when she arrived at home after practice, she found a letter sitting in the mailbox addressed to her. She excitedly ripped open the envelope. She pulled out the letter and began to read. Was Sherry graduating from high school?

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RECALL CUE: Sherry was graduating from high school. She went to the High School of Performing Arts in New York City.

Ron Jackson was surrounded by his supporters at his campaign kick-off dinner. He had been active in local politics for over 15 years and, after a great deal of deliberation, he had decided to run for the state senate. One of the reasons he had been hesitant was because of a small bribe he had accepted from a building contractor early in his political career. He hadn't even really considered it a bribe, but more like an exchange of favors. But he knew it would be disastrous if it got out to the public. It was a very small town and the people didn't forgive very easily. It made him angry that everything he had worked for all these years could be ruined because of one little mistake. Ron was also somewhat concerned that if he were to win the election he would not have much free time to spend with his family. But his supporters had convinced him that he could do a lot of good for the state. He had an impressive record. The campaign kick-off dinner had turned out wonderfully. A local jazz band had been hired and the crowd loved them. After dinner, Ron

gave an inspirational speech  
and then opened the floor for questions. When  
a man in the back of the room stood up,  
Ron knew that he was in big trouble.  
He cleared his throat and took a sip of water.  
Was Ron running for State Senator?

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and then opened the floor for questions. When  
a man asked him his views on abortion,  
Ron knew that he was in big trouble.  
He cleared his throat and took a sip of water.  
Was Ron running for State Senator?  
RECALL CUE: Ron Jackson was running for the State Senate.

The Bentons were spending the day in Rockport,  
wandering through the little shops and art galleries.  
They went into a crafts shop which specialized in  
handcrafted pieces of jewelry. Jim got bored and wandered  
outside, telling her Jane could find him down the  
street when she was through looking.  
Jane fell in love with a pair of jade earrings.  
They were exactly what she had been looking  
for. Her daughter was getting married in a  
couple of months and she was looking for  
earrings to go with her dress. Unfortunately  
they were very expensive and she wasn't sure

she could justify the expense. Jane browsed a while longer and then left the shop. She wondered where Jim had gone to. She checked out a men's clothing store that Jim really liked, but no one remembered seeing anyone matching his description. She began to wonder if he'd gotten lost but then saw him coming out of a book store. She quickly ran over to him, grabbed his arm, and dragged him back down the street. They made their way through all the people in the street. Did Jane find Jim in the clothing store?

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RECALL CUE: The Bentons spent the day in Rockport.

Rich's mother Paulette brought him to his friend David's house to play and then went inside to visit with David's mother. They sat and had a cup of coffee and talked about their jobs and their sons. Rich and David had been friends since first grade. Although they were good friends, at various times over the past couple of years they had gotten into terrible fights. They had been pretty rough on each other. Once they hadn't been permitted to play together for several months because the fighting was so out of control. They had both been talked to about the fighting but it didn't always seem to



do a lot of good. These days they were working on building a tree house together and seemed to really enjoy the project.

Paulette decided to head home and told Rich to be home by 6:00. She needed to go to grade some papers and make up a test for the freshman French class she was teaching. They were a good group of kids this year and she was having fun with the class. She finished all her work and then got started on supper. She looked out the window and saw Rich coming up the walk. As he approached, she saw that his nose was bleeding. She ran to the door to help him inside. Was Rich's mother a teacher?

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RECALL CUE: Rich's mother Paulette brought him to his friend David's house to play. Paulette sat with David's mother and has a cup of coffee.



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